A Survey of Natural Resource Professionals on Threats to Water Resources on California Rangelands

A Statewide Workshop Series

Final Report to California Department of Forestry and Fire Protection

PROJECT TEAM

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I. BACKGROUND

The Range Management Advisory Committee (RMAC) to the California Board of Forestry has raised concerns that significant variability exists in the recommendations made to land managers by natural resources professionals relative to water resources impairment on rangelands. Specifically, the concern is that managers are receiving conflicting advice and opinions about the priority, cause and remedy of sources of water resources impairment on their properties.

Inherently, each natural resources professional brings a unique mix of training, experience, background, and agency perspective to an on-site assessment. This can potentially lead to a wide range of professional opinion. The most appropriate assessment for a specific site is the synthesis of multiple professional opinions ranging across discipline and agency lines.

However, variability in professional opinion can become a problem when a landowner receives conflicting recommendations from various agencies and even from staff within one agency. This does not facilitate resolution of site specific concerns, or protection of water resources.

Collectively, natural resources professionals have significant knowledge and experience about how to assist landowners interested in identifying, prioritizing and fixing specific problems. There is a wealth of knowledge within the ranks of these professionals about how to provide landowners with the information they need in a manner that will facilitate proactive and effective action. It is of value to; 1) capture the composite opinion of natural resources professionals relative to common range management practices, 2) determine how much variability in opinion actually exists between professionals, and 3) determine if this variability can be attributed to discipline, employer, experience, or other professional demographics. This information can be well utilized in ranch water quality short courses, professional continuing education, and cross agency and discipline training efforts. At the request of RMAC, with funding from California Department of Forestry and Fire Protection, and with assistance from numerous State and Federal natural resources agencies this project team developed a State-wide workshop series with the following objectives.

II. WORKSHOP OBJECTIVES

Facilitate on-the-ground discussion among natural resources professionals about the cause, priority, remedy, and approach to achieve the timely correction of typical sources of water resources impairments found on California's rangelands. Provide an on-the-ground opportunity for exchange of professional opinion, training, experience, ideas, successes, and failures relative to tangible, specific, real world problems.

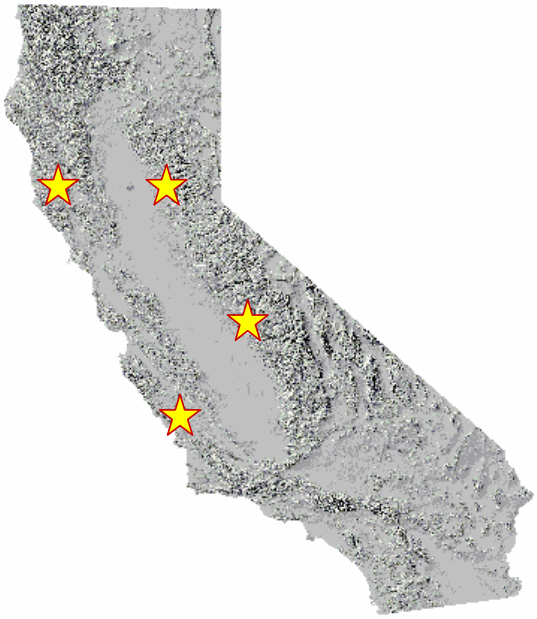
Quantify similarities, variability and pattern in professional opinion found across professionals about the cause, priority, remedy and approach to achieve the timely correction of typical sources of water resources impairments found on California's rangelands. Provide a synthesis opinion of common water resources threats on California's rangelands, representing the input of natural resources professionals across discipline and agency lines. Provide information to target educational opportunities.

III. TARGET AUDIENCE

Local and regional professionals who work with landowners to protect rangeland water resources. These include regulators, educators, consultants, and natural resource management agency staff. These are the individuals who have the opportunity to facilitate the proactive on-the-ground implementation of water resources protection practices by landowners.

IV. WORKSHOP LOCATIONS

One workshop was held at each of four locations across California. Workshops were held at the UC Hopland Research and Extension Center (HREC), the UC Sierra Foothill Research and Extension Center (SFREC), the USFS San Joaquin Experimental Range (SJER), and the Esquela Ranch owned and operated by CSU San Luis Obispo (SLO). HREC, SFREC, SJER, and SLO workshop locations are located on oak woodland – annual grasslands in Mendocino, Yuba, Madera, and San Luis Obispo Counties, respectively. These four sites provide an excellent representation of the soil, climate, topographic, and range management practices typical of this and other rangeland types.



V. WORKSHOP FORMAT AND METHODS

FORMAT

Each workshop was a 1 day event, and the same format was followed at all 4 workshops. Workshops were conducted during the middle of the 2001-02 wet season (Jan through Feb of 2002). Six to seven sites were pre-selected at each location prior to the workshop date. Sites were selected to represent the range of common management related threats to water resources found on California's rangelands. Sites include erosion features (road culverts, stream crossings, etc.) nutrient/pathogen loading features (corrals, holding pastures, water troughs, etc.), riparian areas (riparian grazing, water gaps, etc.) (Table 1). All sites were visited by the workshop participants as a single group, lead and facilitated by members of the project team.

Table 1. Potential threats to water resources evaluated at each workshop. Site number represents the order in which each potential threat / site was visited during each workshop. All potential threats were not available / included in each workshop.

	Site Number			
Potential Threat	HREC		SJER	SLO
Corral System	--	2	1	4
Livestock Concentration Site	6	5	6	--
Manure Stockpile	2	--	--	--
Livestock Alley – Lane	--	3	2	--
Livestock Drinking Water Gap	--	7	--	--
Seasonal Stream Crossing	1	1	4	5
Road Culvert – Drainage System	4	6	--	1, 2
Grazing in Riparian Pasture	3	4	3	3
Headcut – Gully	--	--	5	6
Large Erosion Feature	5	--	--	--

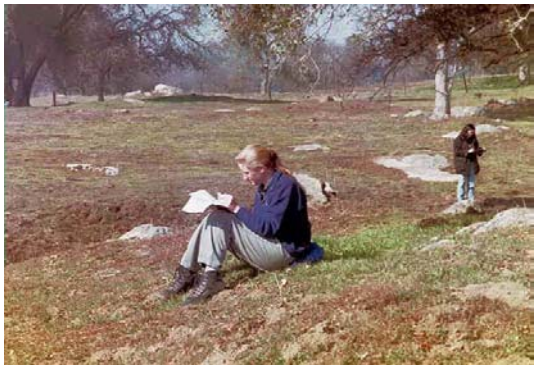
At the start of each workshop, the group was assembled and the overall objectives and format of the workshop was explained. The following ground rules were established: 1) there are no correct or incorrect answers at each site or to any question, only opinions, 2) speak freely, 3) listen to others, and 4) respect each others point of view. The confidentiality of all information gathered from each participant was assured, and the importance of completing the participant survey and site evaluation forms was stressed to the participants.

PARTICIPANT SURVEY

Each participant was asked to complete a participant survey (Appendix I). This survey provides us with professional demographic information (field of study, experience, job responsibilities, etc.) allowing us to characterize the participant pool, as well as to examine possible trends in opinion related to discipline, experience, employer, etc.

SITE EVALUATIONS

At each site, the group was given a very brief introduction to the site. The type and importance of the specific management practice at each site was explained by the local land manager. Each participant was then asked to evaluate the site by completing the site evaluation survey (Appendix II). These evaluations were conducted in confidence, with no group interactions allowed. Participants were given ~20 minutes per site to complete the site evaluation.

Once evaluations had been collected a group discussion of the site was lead by the workshop facilitator to allow an exchange of opinions concerning the site among the participants. These discussions were an extremely effective portion of the workshop,

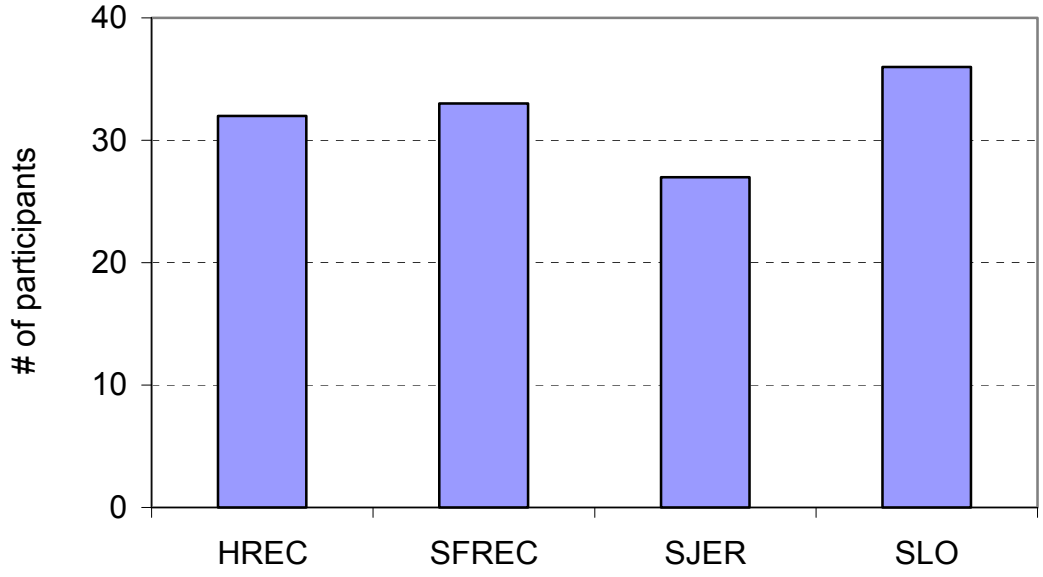
giving participants a chance to hear first hand how their colleagues in other disciplines and agencies viewed potential water quality threats. While variability in professional opinion became evident in these discussions, the similarities were also clear.

VI. RESULTS

The results presented in this report illustrate the large dataset collected in this workshop series. These results are a synthesis of data collected within and across workshops for a selected set of participant demographics and potential water resources threats (corral system, seasonal stream crossing for vehicles and livestock, ranch road drainage, and a grazed riparian area). A synthesis of these results will be published in appropriate peer-reviewed natural resources journals, and will be incorporated in the UCCE-NRCS Ranch Water Quality Short Course.

A total of 129 professionals participated in this workshop series (Figure 1). The dataset is comprised of: 1) participant response to each participant survey question (n=25) representing a potential of **3,225 responses**, 2) participant response at each workshop (HREC=33, SFREC=31, SJER=28, SLO=37) to each question in the site evaluation (n=18) at each site (HREC=6, SFREC=7, SJER=6, SLO=6), resulting in a potential of **13,932 responses**. Response rate among participants was variable (range from 85 to 100%) with a **mean response rate of ~90%.**

Figure 1. Attendance at four rangeland water resources impairment workshops.



PARTICIPANT PROFESSIONAL DEMOGRAPHICS

Figures 2 through 14 summarize the responses of participants to key background, education, experience, and philosophical questions regarding their role as natural resources professionals working in the area of rangeland water resources. The specific survey questions soliciting this data can be found in Appendix I. This demographic information is provided to describe the actual workshop audience relative to the target audience, and to provide context for the results of site evaluation reported later in this report.

Several figures are of particular interest. Figure 3 illustrates the breadth of disciplines associated with rangeland water resource issues. While Figure 4 indicates the experience level of participants ranges fairly evenly from <5 to >15 years, Figure 6 clearly shows that 50% of the participants have worked with their current employer less than 5 years. Figure 9 indicates that 40% to 80% of the participants are award of the California Rangeland Water Quality Plan which is the SWRCB approved NPS plan for the State to address non-point source pollution on California rangelands. Finally, Figure 12-13 illustrate the strong confidence participants has in landowner education and landowner watershed group activity as effective mechanisms to improve rangeland water quality.

Figure 2. Educational level of workshop participants

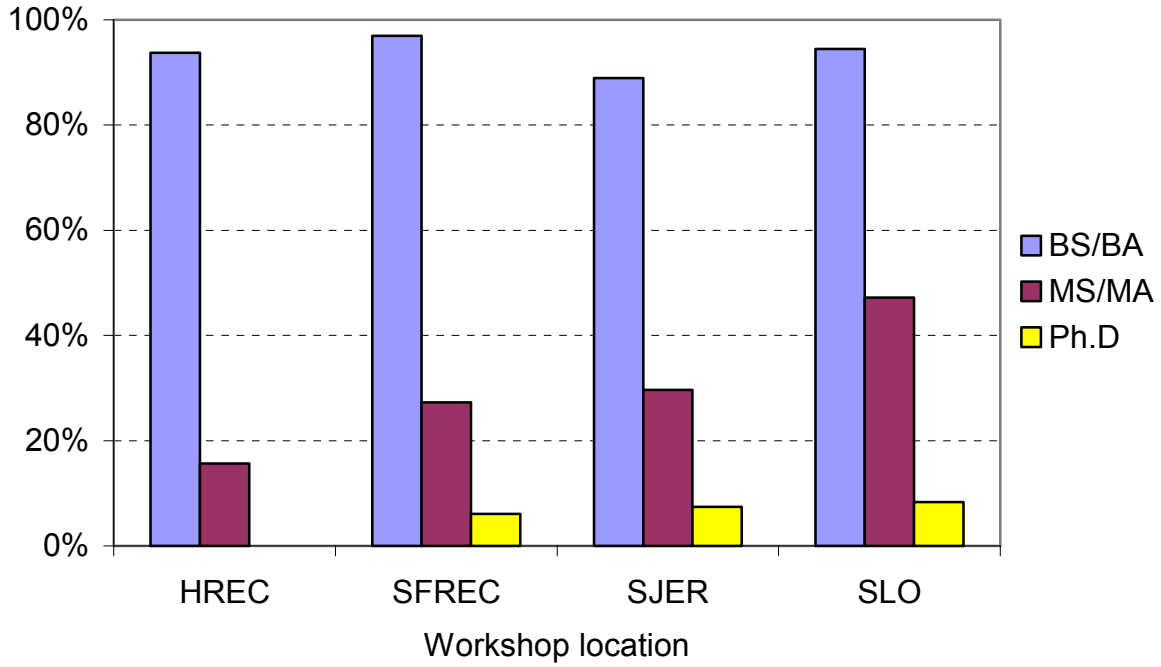


Figure 3. Subject area of education

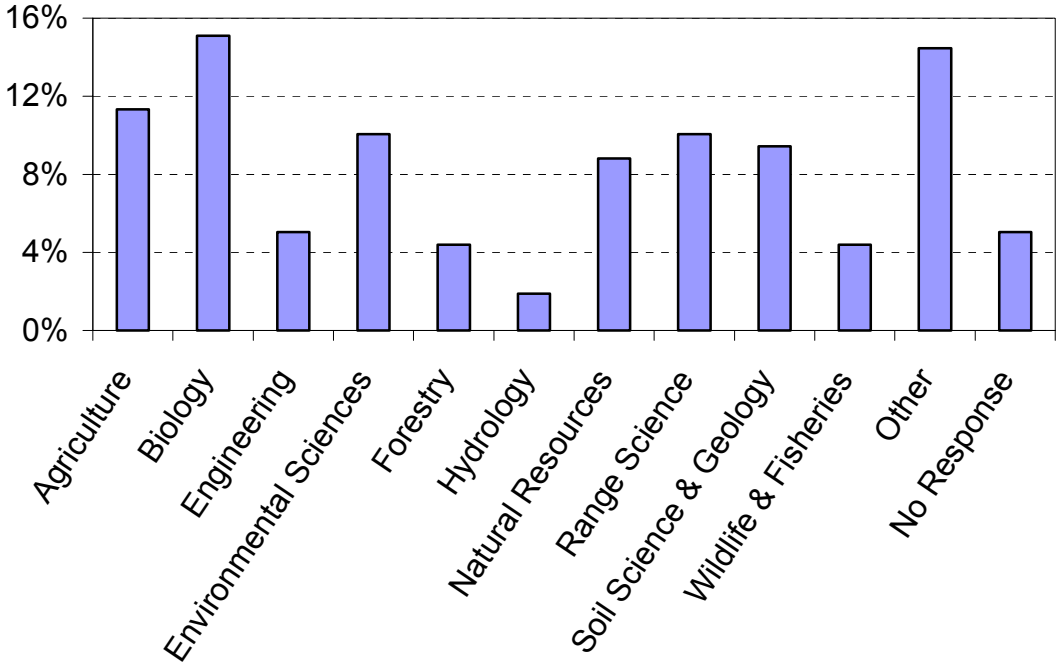


Figure 4. Total years experience as a Natural Resource Professional

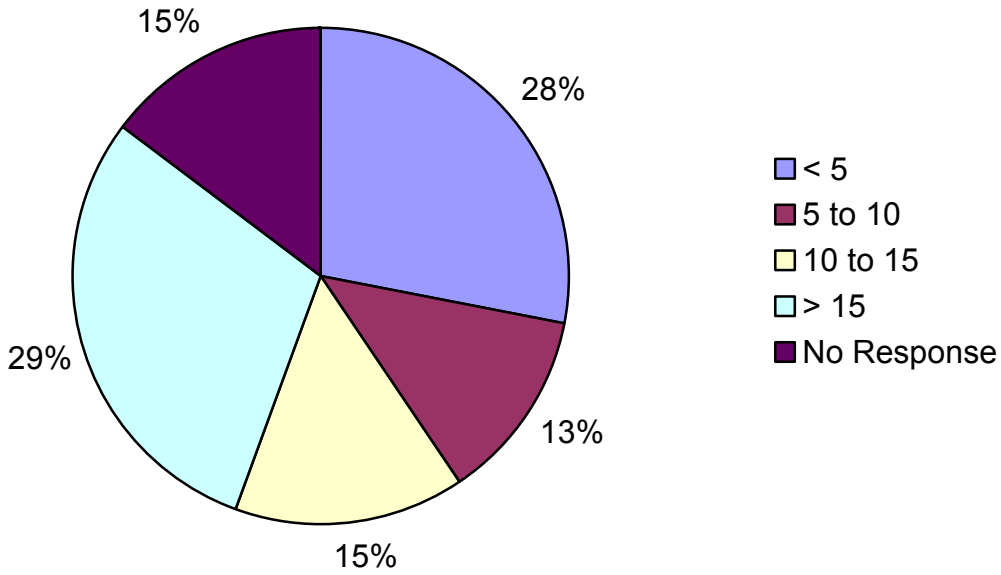


Figure 5. Current Employer

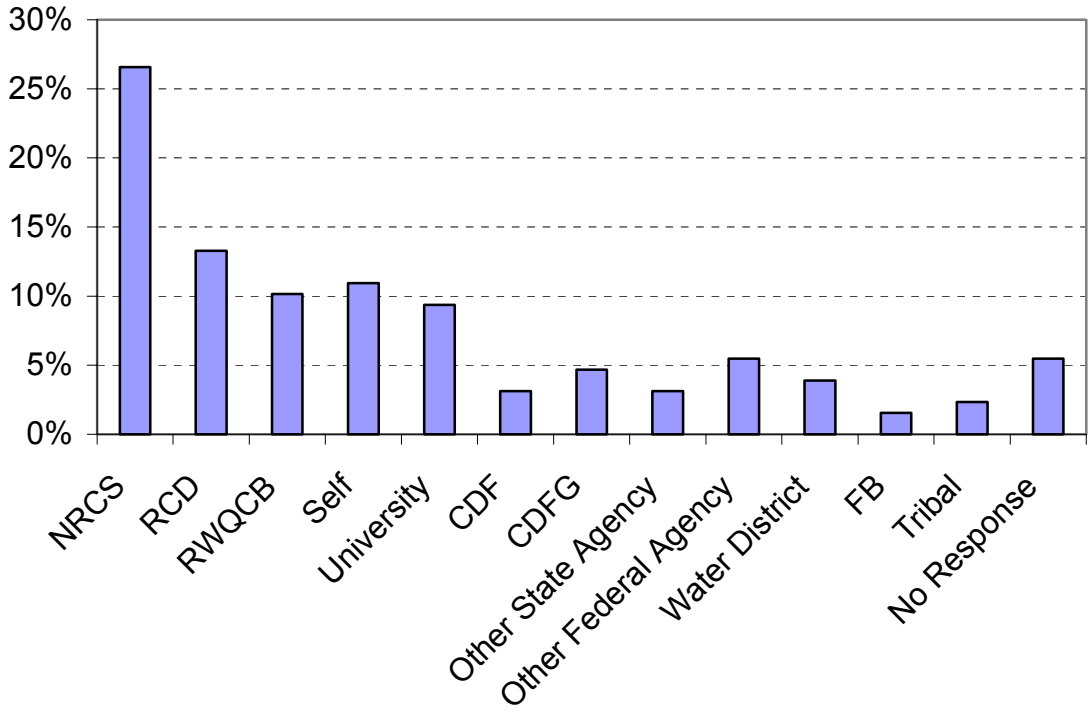


Figure 6. Years with current employer

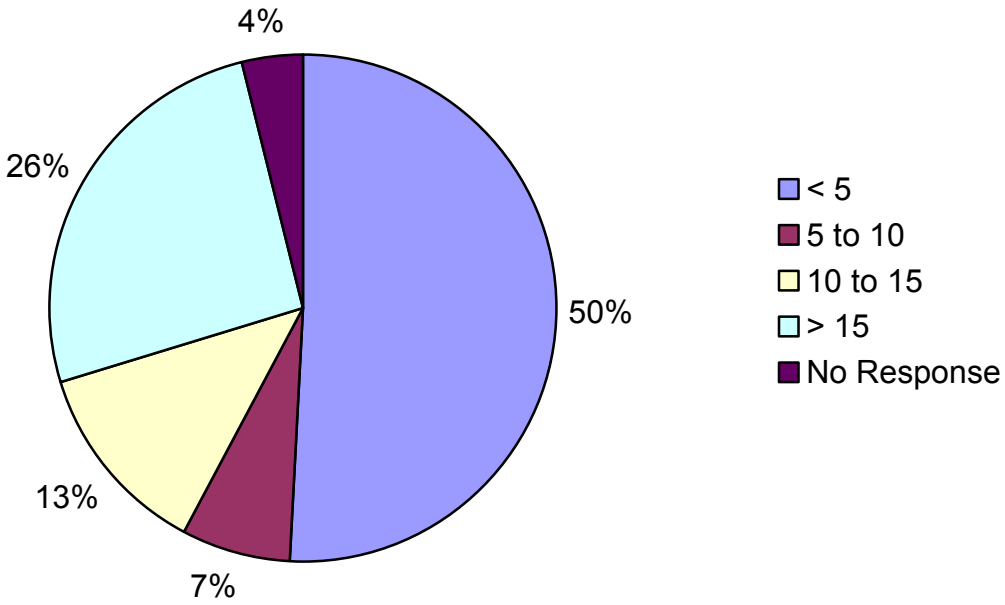


Figure 7. Do you work directly with rangeland managers?

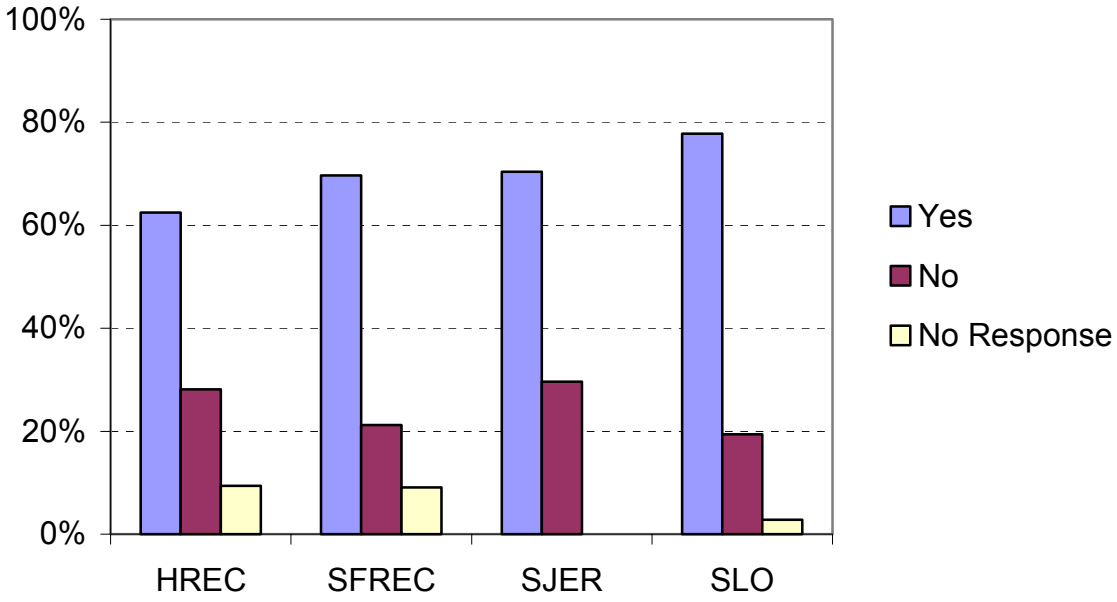


Figure 8. In what capacity do you work with rangeland managers?

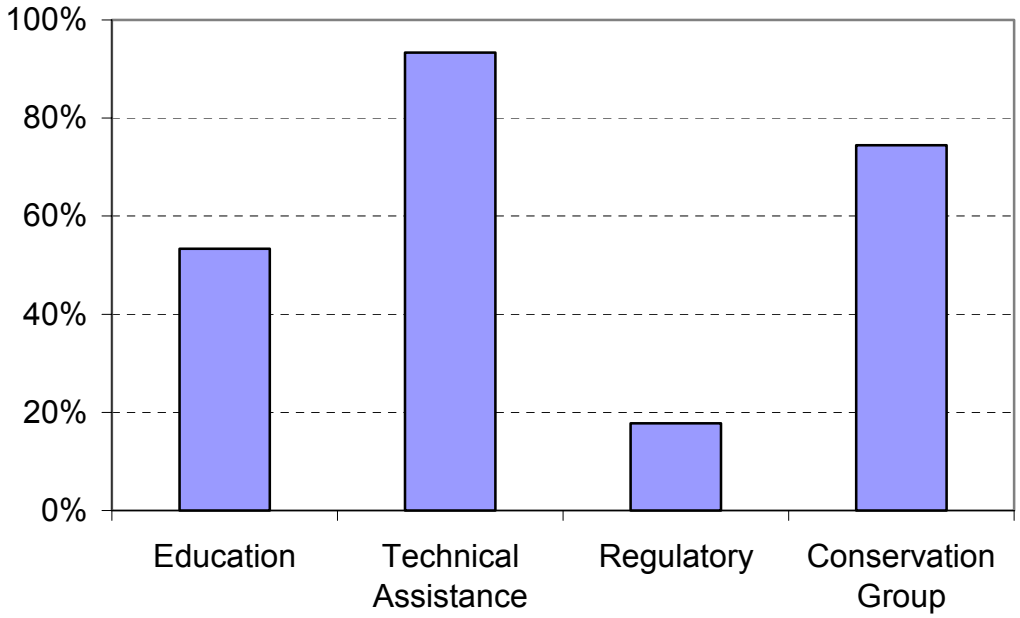


Figure 9. Have you heard of the CA Rangeland Water Quality Plan?

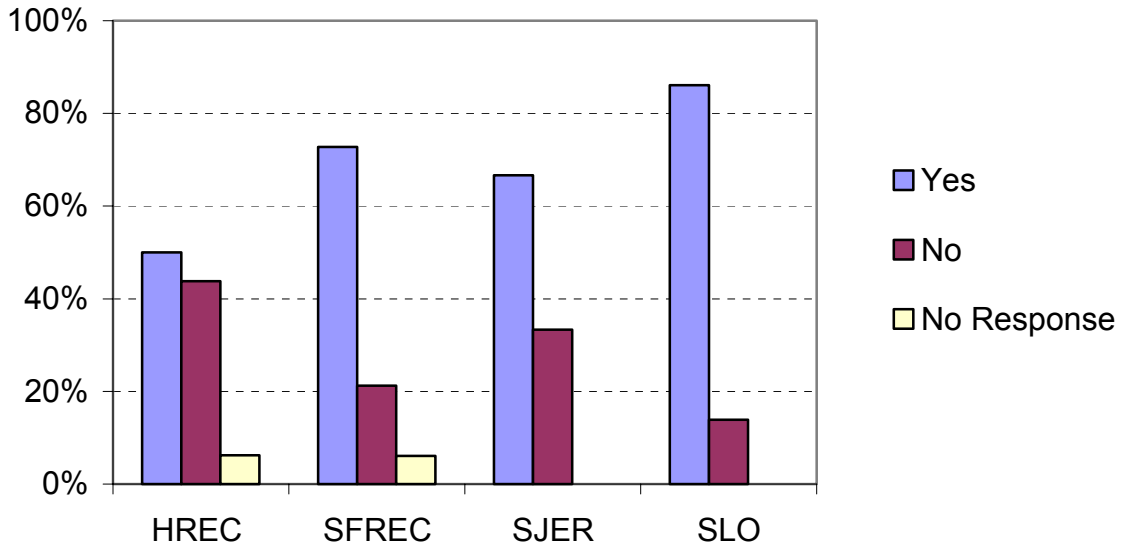


Figure 10. How effective do you think development of new regulations are at safe-gaurding rangeland water resources? (1=not effective, 5=highly effective)

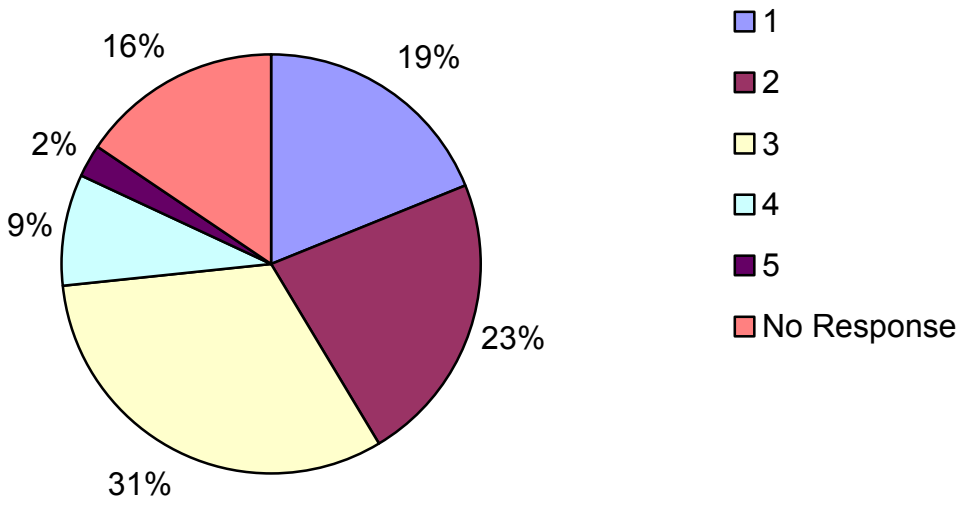


Figure 11. How effective do you think Total Maximum Daily Loads are at safe-guarding rangeland water resources? (1=not effective, 5=highly effective)

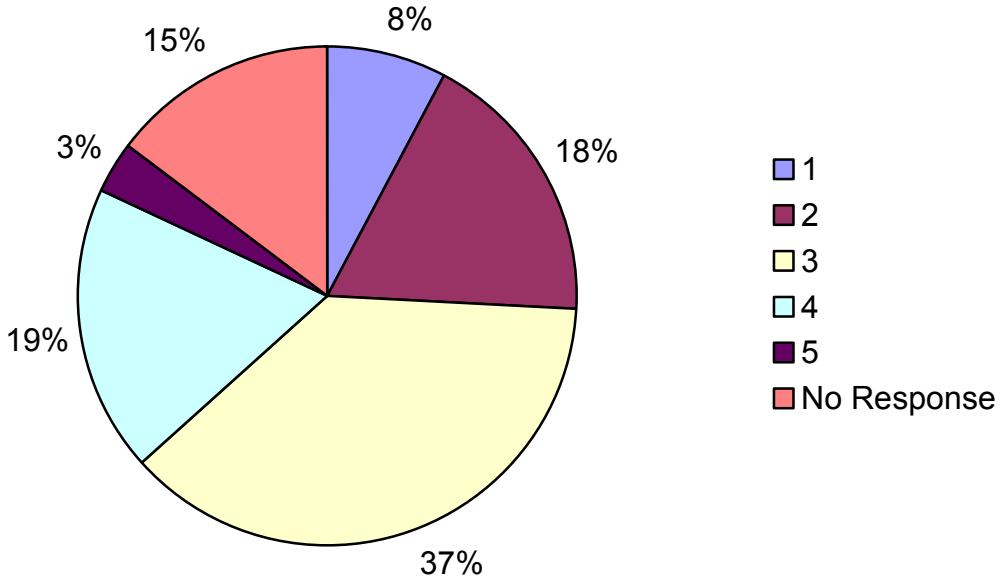


Figure 12. How effecctive do you think landowner education and ranch water quality planning are at safe-guarding rangeland water resources? (1=not effective, 5=highly effective)

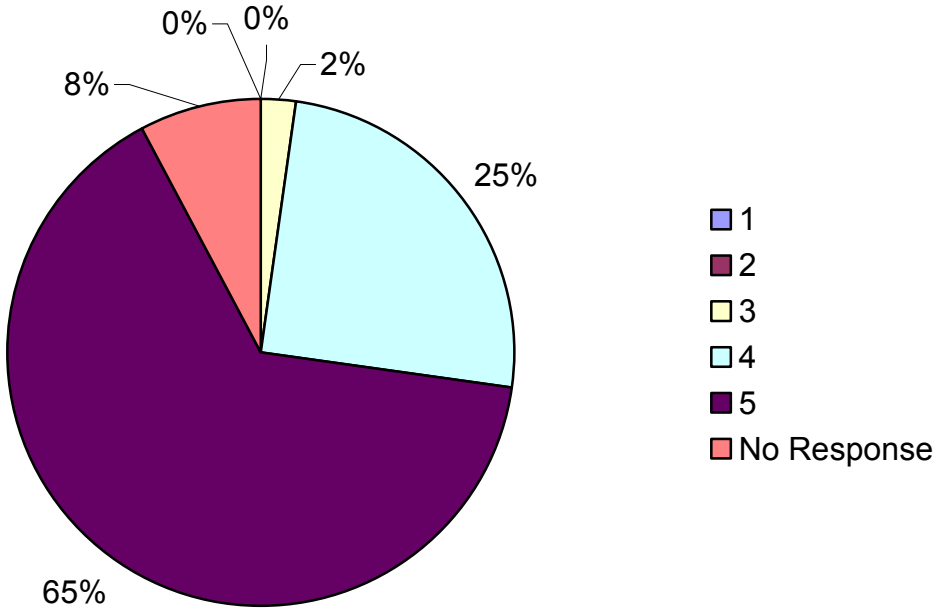
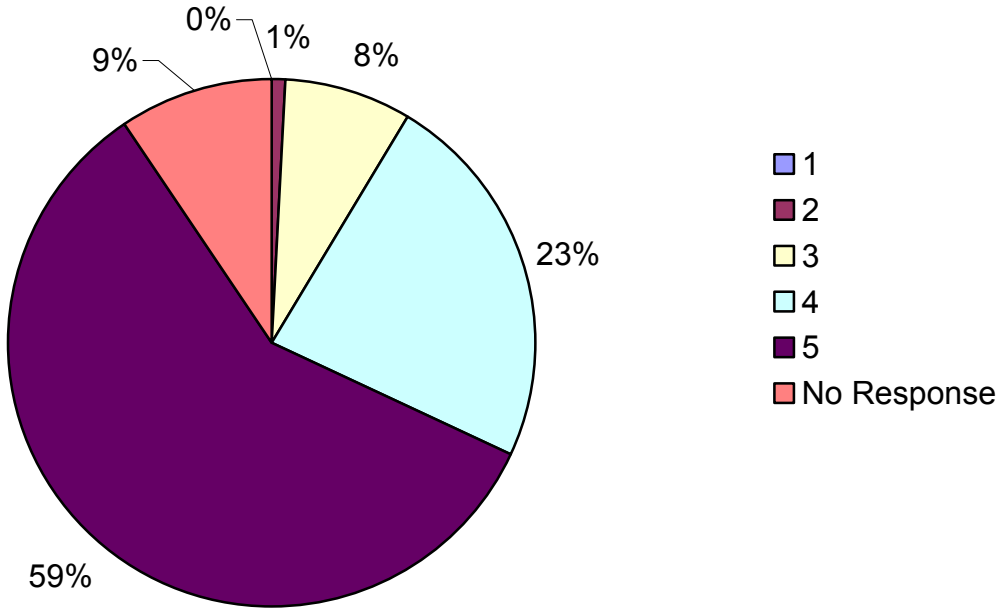


Figure 13. How effective do you think landowner driven watershed groups are at safe-guarding rangeland water resources? (1=not effective, 5=highly effective)



CORRAL SITE EVALUATIONS POOLED ACROSS WORKSHOPS AND PARTICIPANT DEMOGRAPHICS.

Figure 14 illustrates the corral sites enrolled in this workshop series. Corrals are livestock holding and handling facilities utilized by ranchers for a variety of herd management and animal health practices. Every working ranch has at least one corral. Corral location on a ranch tends to be historic, with the placement dependent upon livestock management needs and not water resource protection. Corrals generally have bare ground, and moderate to heavy accumulations of livestock manure. Figures 15-18 report site evaluations by participants at the SFREC (Site 2), SJER (Site 1), and SLO (Site 4) workshops. The corrals are similar in size, use, and proximity (within 30 to 100 yards) to a stream. These results pool or lump data regardless of participant demographic, providing the overall group opinion of the threat corrals pose to water resources when placed near a stream. Demographic specific responses are reported later in this report for these sites.

Over 90% of participants felt the corral was a threat to water resources, with water quality being the most threatened attribute. Of greatest concern was transport of nutrients, pathogens and sediment to the stream during rainfall events. 77% of participants felt the corral was a low to moderate threat to water resources at the sub-basin scale (10,000 to 20,000 acre watershed), with only 2% calling it an extreme threat. 79% felt that the threat the corral poses to water quality could be mitigated with management practices such as vegetated buffer strips, runoff water diversion and

management, cover crops, and manure cleaning. 21% felt the corral must be relocated to remove the threat to water quality.

Figure 14. Corral sites evaluated by participants at the SFREC (Site 2), SJER (Site 1), and SLO (Site 4) workshops.

Figure 15. Is this corral a threat to water resources?

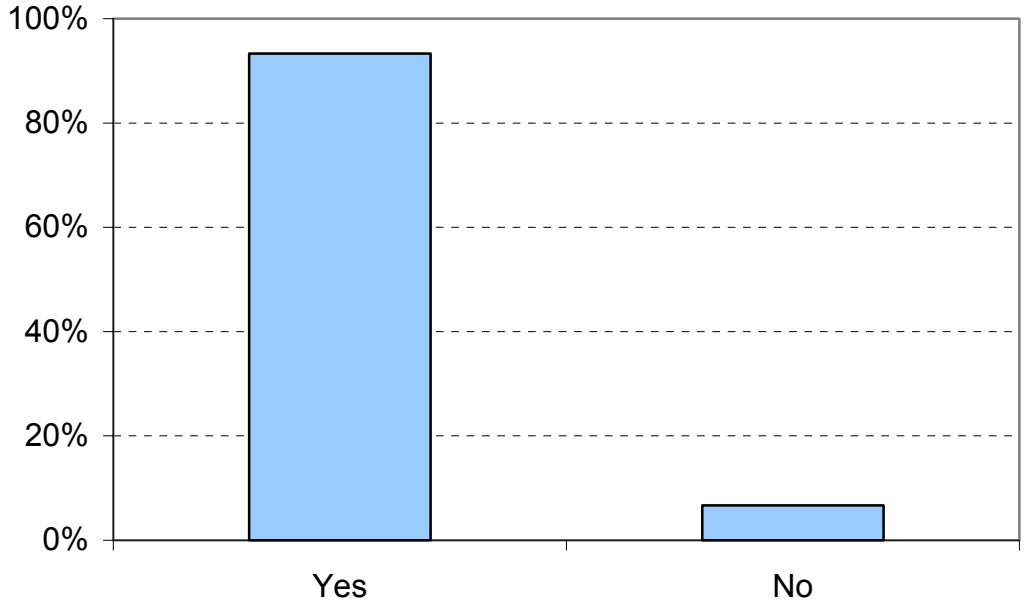


Figure 16. Mean threat rating (0=none,5=extreme) of this corral to each water resource attribute.

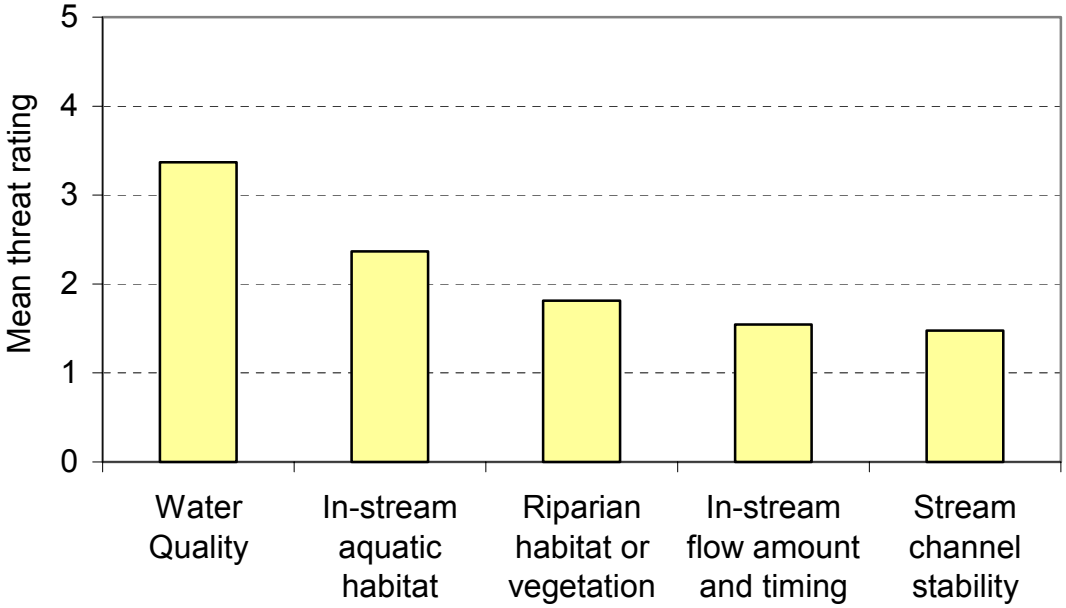


Figure 17. Rate this corral's threat at the sub-basin scale (10,000-20,000ac), 1=low, 5=extreme

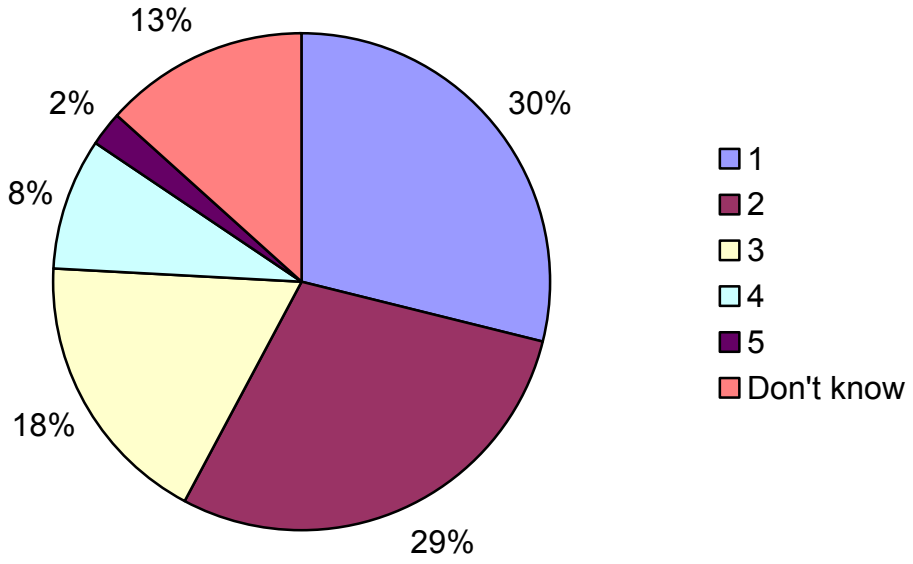
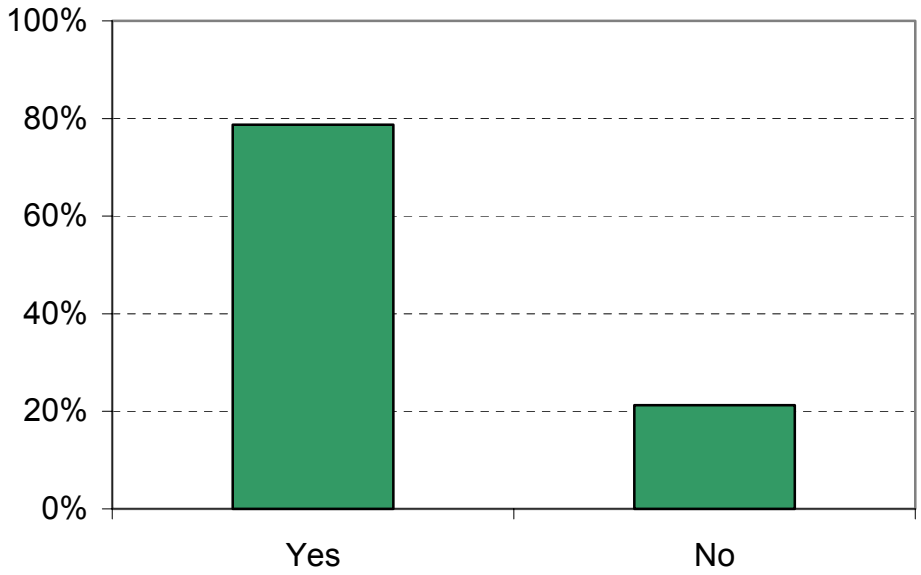


Figure 18. Can the management at this corral be corrected sufficiently to protect water resource and keep the corral in place?



SEASONAL STREAM CROSSING EVALUATIONS POOLED ACROSS WORKSHOPS AND PARTICIPANT DEMOGRAPHICS.

Figure 19 illustrates the seasonal stream crossing sites enrolled in this workshop series. Seasonal stream crossings are locations where undeveloped ranch roads cross intermittent or perennial streams. These sites are extremely common on ranches in California. Traffic volume on these roads is often low, limited to ranchers feeding or checking livestock and other ranch management activities. Figures 20 - 23 report site evaluations by participants at the HREC (Site 1), SFREC (Site 1), SJER (Site 4), and SLO (Site 5) workshop. Seasonal stream crossing at each workshop were similar in traffic volume, size, and stream type. These results pool or lump data regardless of participant demographic, providing the overall group opinion of the threat stream crossings pose to water resources. Demographic specific responses are reported later in this report for these sites.

Over 90% of participants felt the crossing was a threat to water resources, with water quality being the most threatened attribute, followed by aquatic habitat. Of greatest concern was transport of sediment to the stream during rainfall events. 74% of participants felt the crossing was a low threat to water resources at the sub-basin scale (10,000 to 20,000 acre watershed), with only 3% calling it an extreme threat. 90% felt that the threat the crossing poses to water quality could be mitigated with management practices such as diversion of road runoff, armoring the crossing with rock, and wet season use restriction. 10% felt the crossing must be removed to stop the threat to water quality.

Figure 19. Seasonal stream crossing sites evaluated by participants at the HREC (Site 1), SFREC (Site 1), SJER (Site 4), and SLO (Site 5) workshops.

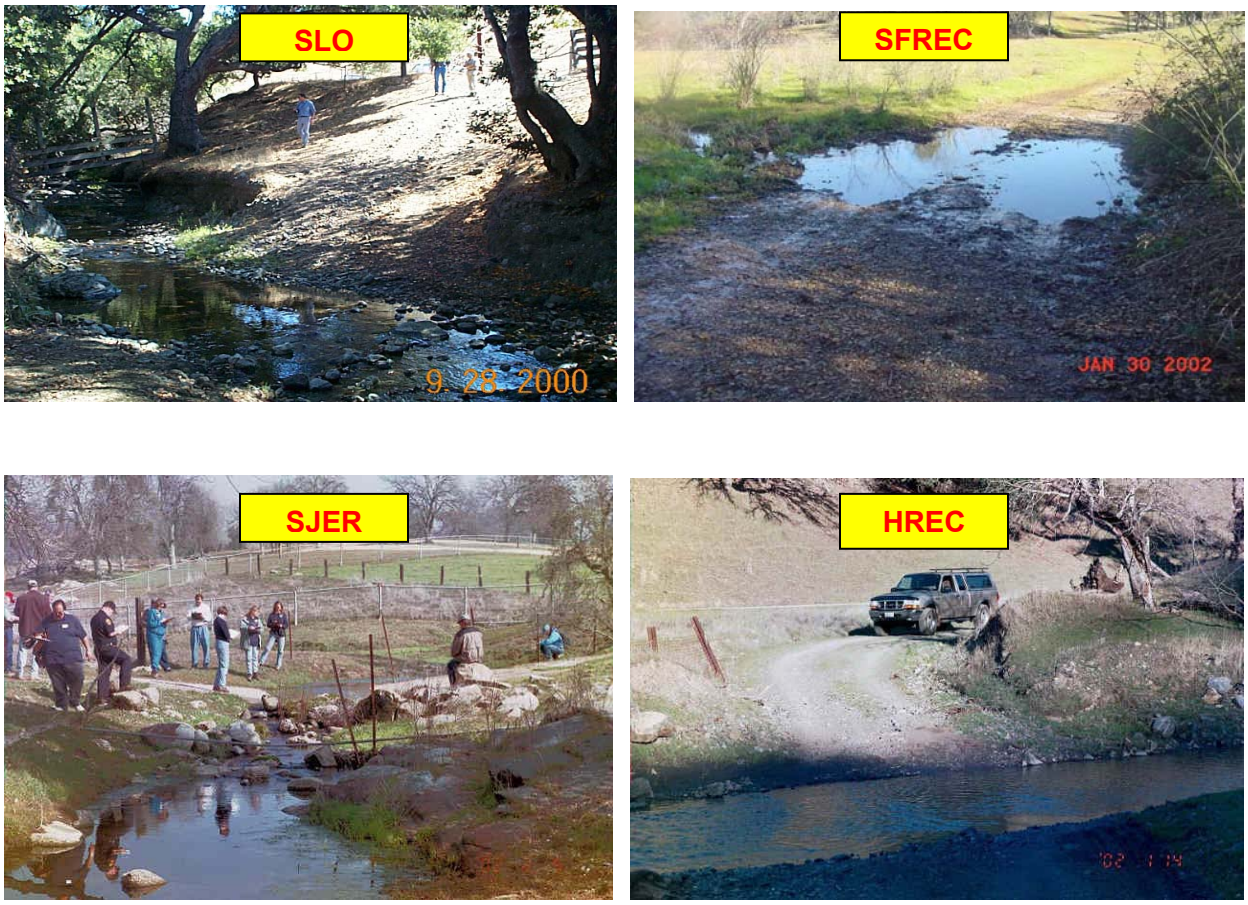


Figure 20. Is this seasonal stream crossing a threat to water resources?

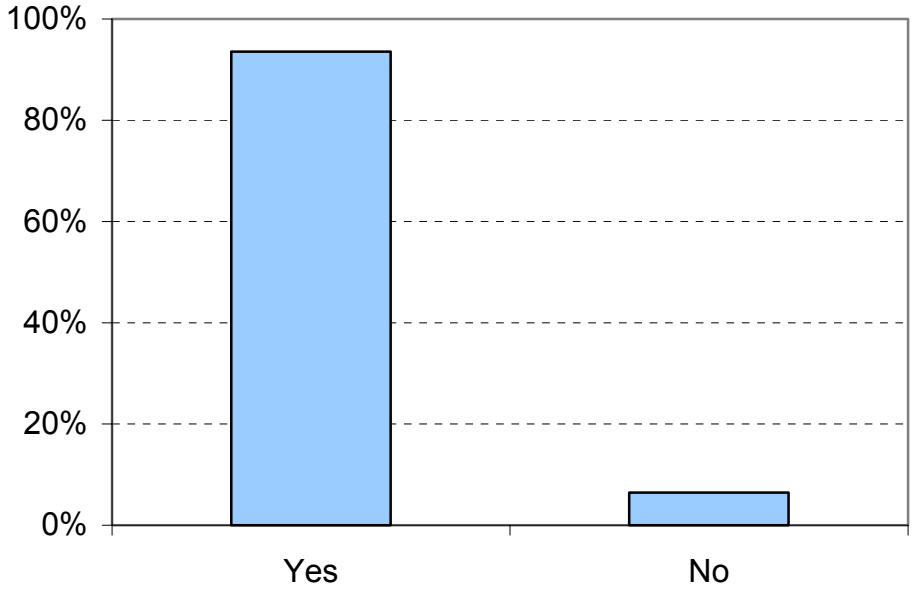


Figure 21. Mean threat rating (0=none, 5=extreme) of this seasonal stream crossing to each water resource attribute.

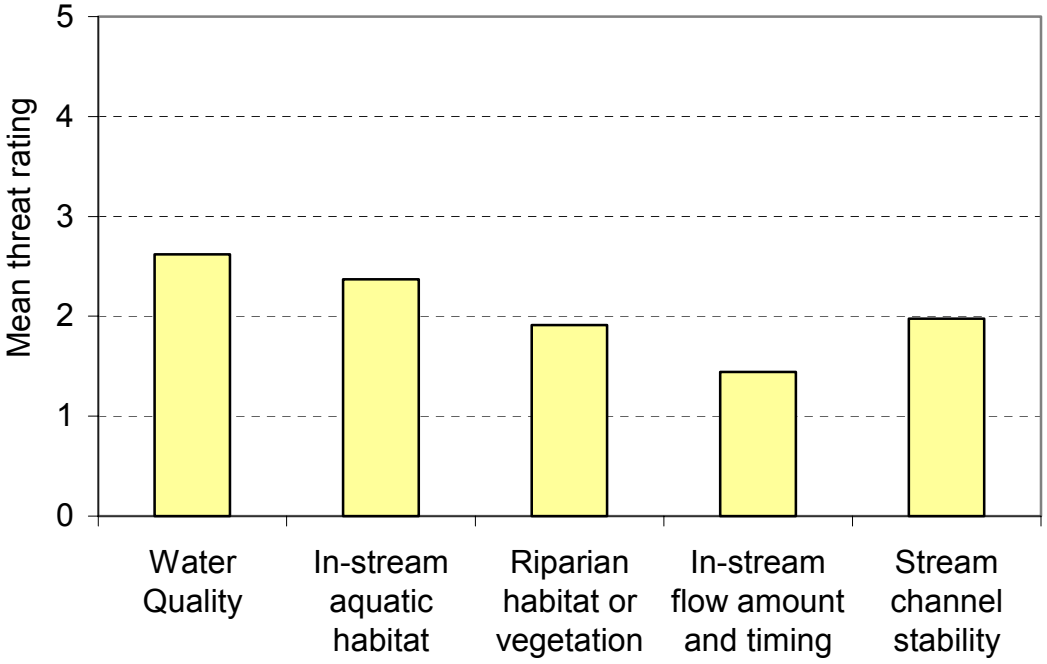


Figure 22. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme

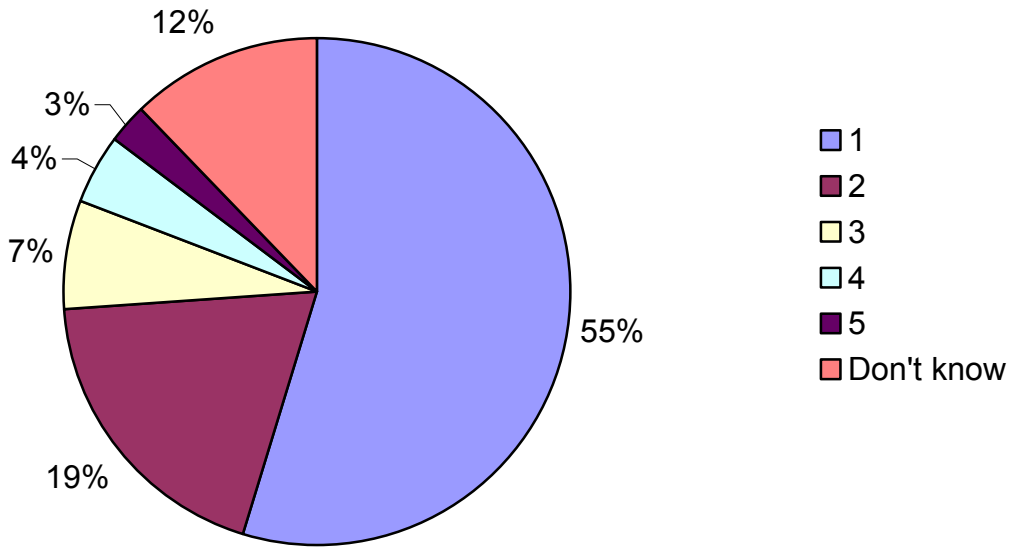
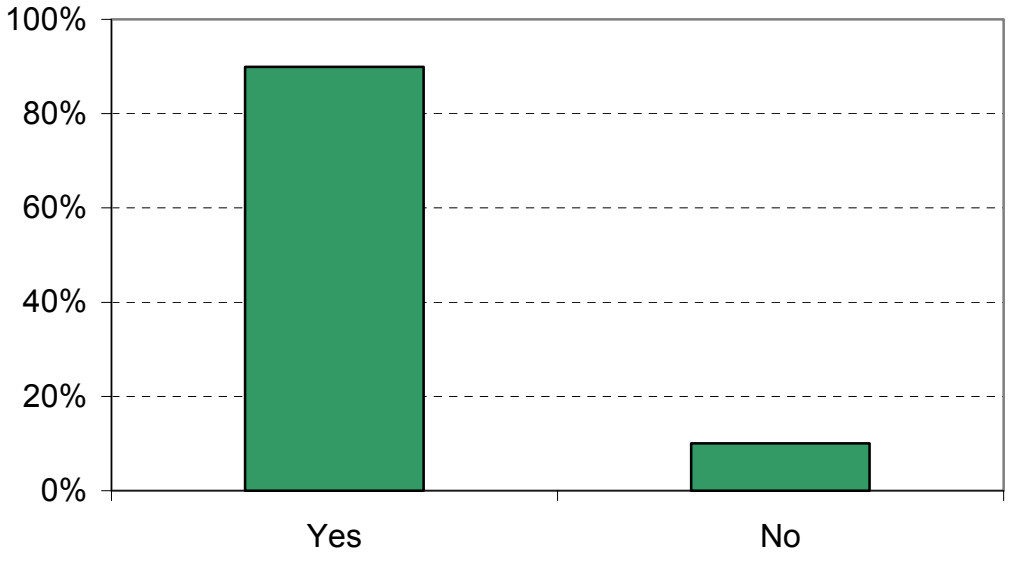


Figure 23. Can the management at this seasonal stream crossing be corrected sufficiently to protect water resource and keep the crosing in place?



ROAD CULVERT AND DRAINAGE SITE EVALUATIONS ACROSS WORKSHOPS AND PARTICIPANT DEMOGRAPHICS.

Figure 24 illustrates the road culvert and drainage sites enrolled in this workshop series. Undeveloped ranch roads are a major source of erosion and sediment on most ranches. Road drainage and culvert design are well recognized threats to water resources. Figures 25 - 28 report site evaluations by participants at the HREC (Site 1), SFREC (Site 1), and SLO (Sites 1 and 2) workshops. Road drainage and culvert sites at each workshop were similar in size, proximity to streams, and type. These results pool or lump data regardless of participant demographic, providing the overall group opinion of the threat stream crossings pose to water resources. Demographic specific responses are reported later in this report for these sites.

95% of participants felt the culvert was a threat to water resources, with water quality being the most threatened attribute, followed by streambank stability. Of greatest concern was transport of sediment to the stream during rainfall events, and elevated streamflow levels. 69% of participants felt the culvert was a low to moderate threat to water resources at the sub-basin scale (10,000 to 20,000 acre watershed), with only 3% calling it an extreme threat. 92% felt that the threat the culvert poses to water quality could be mitigated with management practices such as diversion of road runoff, armoring the culvert with rock, and wet season use restriction. 8% felt the culvert must be removed to stop the threat to water quality.

Figure 24.Road culvert and drainage sites evaluated by participants at the HREC (Site 1), SFREC (Site 1), and SLO (Sites 1 and 2) workshops.

Figure 25. Is this road culvert and drainage a threat to water resources?

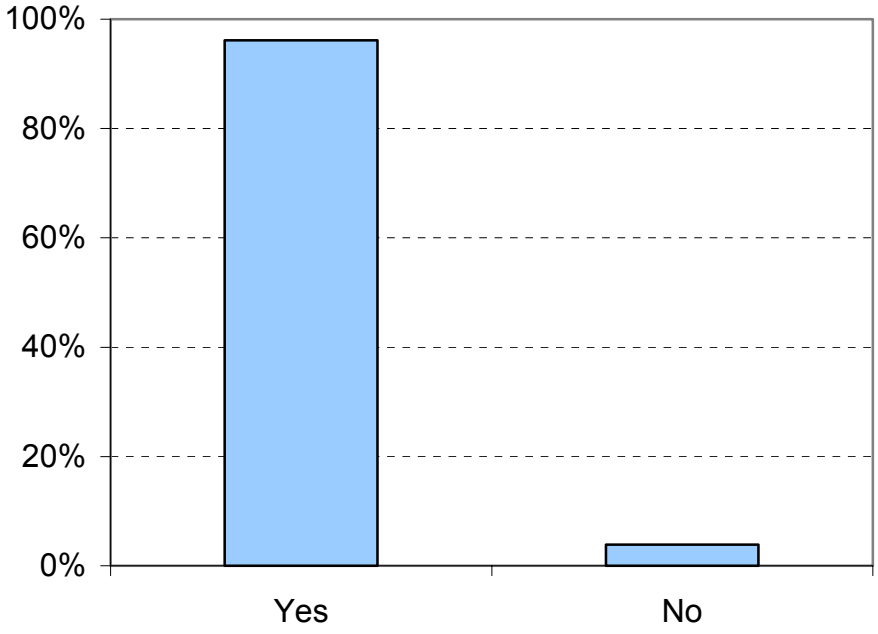


Figure 26. Mean threat rating (0=none, 5=extreme) of this road culvert and drainage to each water resource attribute.

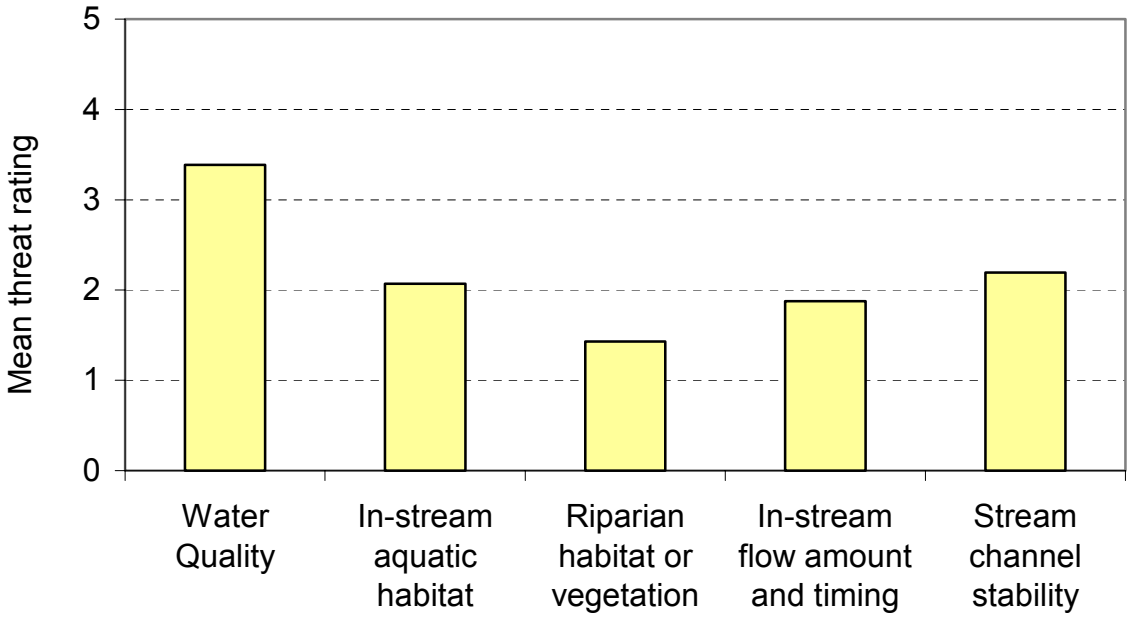


Figure 27. Rate the threat this road culvert and drainage is at the sub-basin scale (10,000-20,000ac), 1=low, 5=extreme

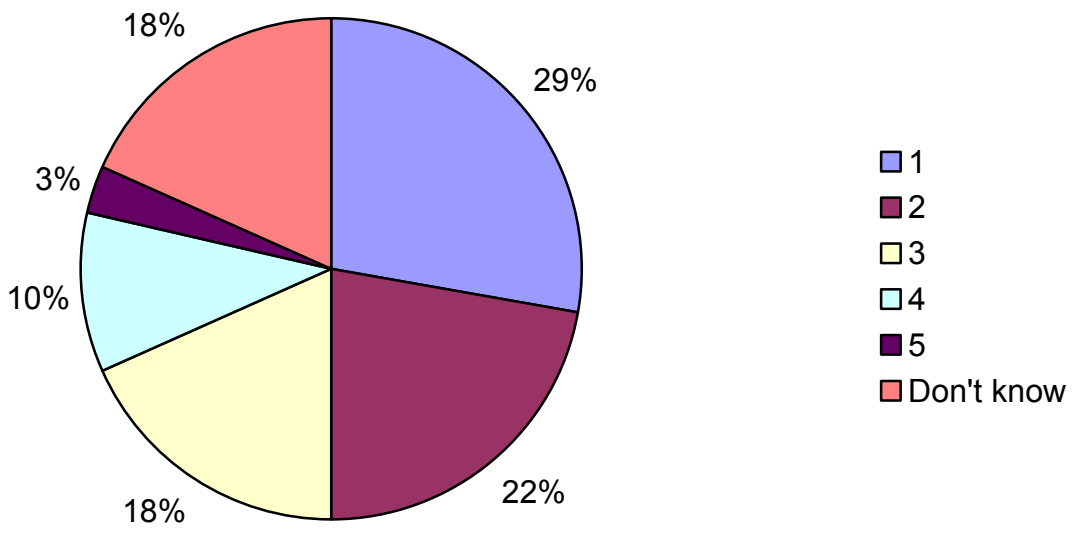
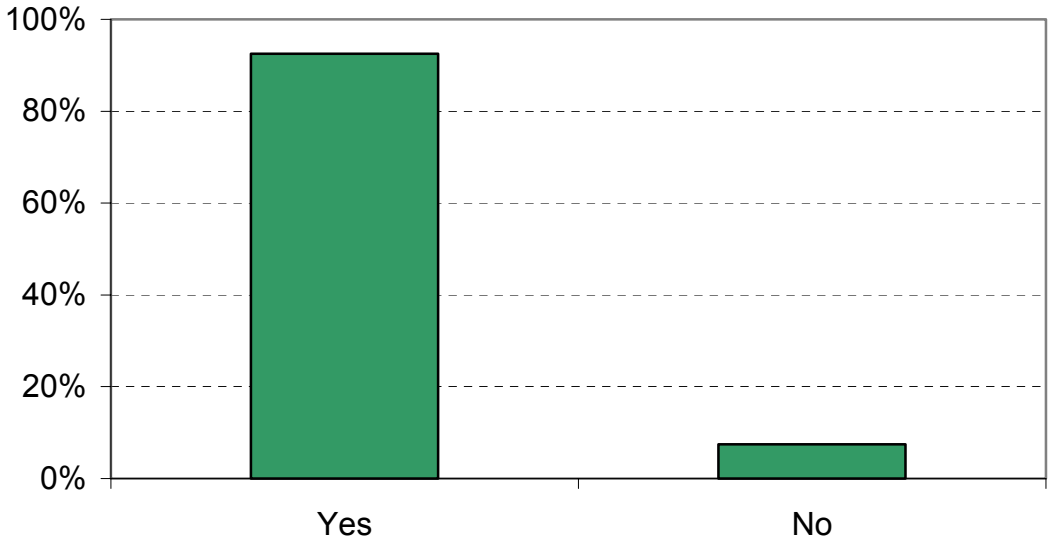


Figure 28. Can the management at this road culvert and reach be corrected sufficiently to protect water resource and keep the road in place?



GRAZED RIPARIAN SITE EVALUATIONS POOLED ACROSS WORKSHOPS AND PARTICIPANT DEMOGRAPHICS.

Figure 29 illustrates the riparian grazing sites enrolled in this workshop series. Grazing is the primary range management practice on ranches. Grazing of riparian areas along streams is common, and is a source of much controversy in the State and West. Figures 30 - 33 report site evaluations by participants at the HREC (Site 2), SFREC (Site 4), and SJER (Site 3). Riparian grazing sites at each workshop were similar in size and management style. These results pool or lump data regardless of participant demographic, providing the overall group opinion of the threat stream crossings pose to water resources. Demographic specific responses are reported later in this report for these sites.

97% of participants felt the riparian grazing was a threat to water resources, with water quality, in-stream habitat, riparian habitat and vegetation, and streambank stability at risk. Concerns were extensive, ranging from instream to terrestrial habitat degradation, water quality degradation, and streambank erosion. 73% of participants felt the riparian grazing was a low to moderate threat to water resources at the sub-basin scale (10,000 to 20,000 acre watershed), with only 2% calling it an extreme threat. 92% felt that the threat the grazing poses to water quality could be mitigated with management practices such as restrictions on season, frequency and intensity of grazing, riparian pasture fencing, and off-site water development. 8% felt the grazing must be removed to stop the threat to water quality.

Figure 29. Grazed riparian sites evaluated by participants at the HREC (Site 2), SFREC (Site 4), and SJER (Site 3).

Figure 30. Is this riparian grazing a threat to water resources?

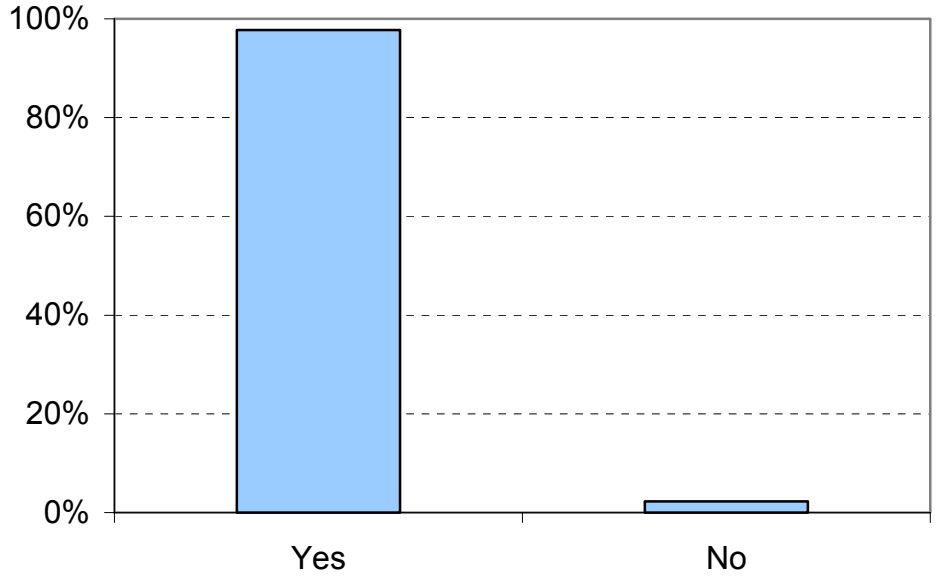


Figure 31. Mean threat rating (0=none, 5=extreme) this riparian grazing is to each water resource attribute.

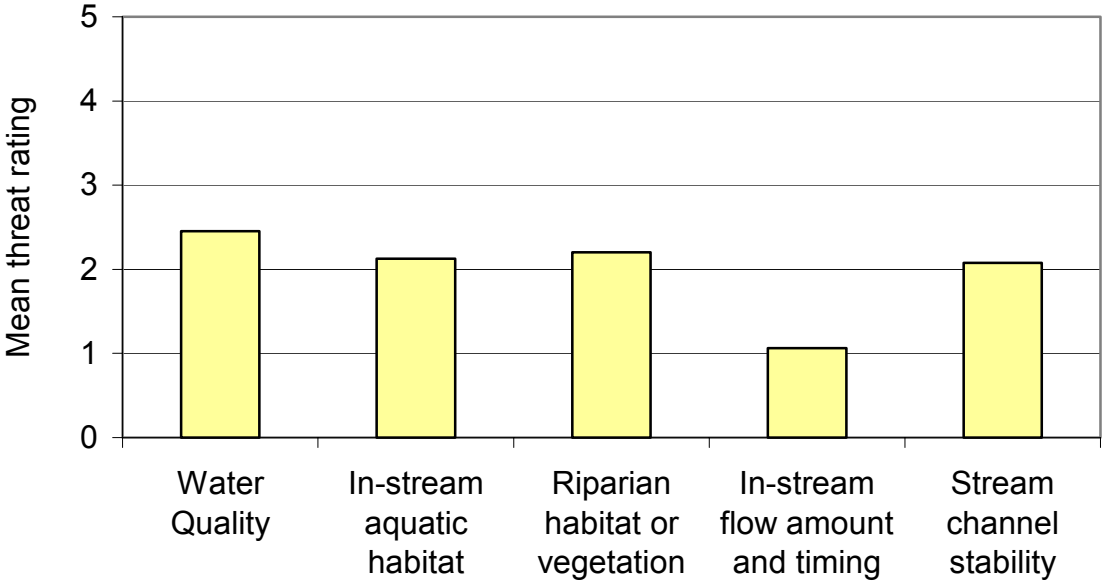


Figure 32. Rate this riparian grazing site's threat to water resources at the sub-basin scale (10,000-20,000ac), 1=low, 5=extreme

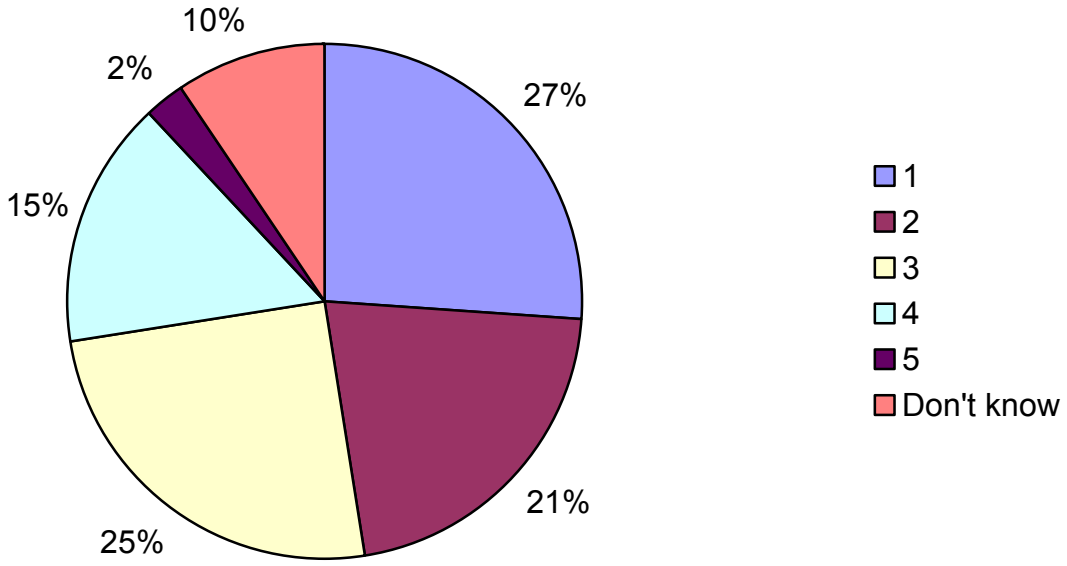
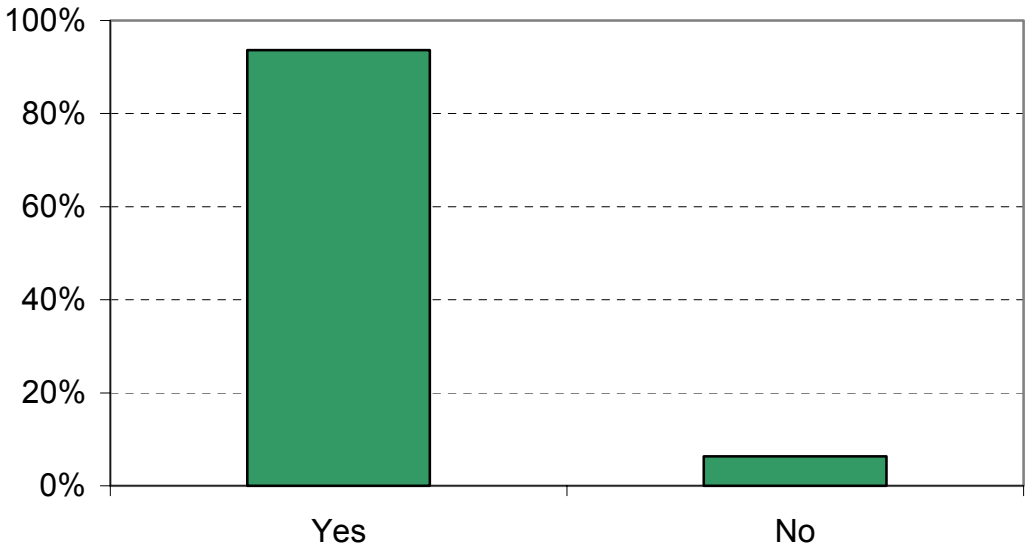


Figure 33. Can the riparian grazing management at this site be corrected sufficiently to protect water resource and keep grazing in place?



SITE EVALUATION ANALYSIS BY PARTICIPANT DEMOGRAPHIC AND POOLED ACROSS WORKSHOPS

Analysis of the dataset for relationships between participant professional demographics (education, employer, experience, etc.) and participant site evaluations is presented here. These results represent the break-down of responses presented in Figures 15-18, 20-23, 25-28, 30-33 by professional demographic. Table 2 reports the 4 demographics used in this analysis, the levels of each demographic, and the sample size. Demographics with a sample size smaller than 6 were excluded from analysis.

Table 2. Demographics utilized for analysis of relationships between participant professional demographics and participant site evaluations for corrals.

DEMOGRAPHIC	LEVEL	SAMPLE SIZE
Employer	Resources Conservation District **(RCD)**	12
	Natural Resources Conservation Service **(NRCS)**	27
	University	6
	Self Employed **(Self)**	8
	Regional Water Quality Control Board **(RWQCB)**	10
Educational Background	Natural Resources Utilization **(NRuse)**; includes Agriculture, Agricultural Engineering, Forestry, Range Science, Animal Science, Watershed Management, Aquaculture	22
	Physical Sciences **(PhysiSci)**; includes Engineering, Hydrology, Soil Science, Geology, Geography, Biochemistry	23
	Natural Resources Protection **(NRpro)**; includes Environmental/Natural Resources-Biology, Environmental Science, Natural Resources, Wildlife & Fisheries, Ecology, Plant Science, Wildlife Management, Zoology	26
Total years experience as Natural Resource Professional	Less than 5 years **(<5 yr)**	24
	5 to 10 years **(5 to 10 yr)**	10
	10 to 15 years **(10 to 15 yr)**	13
	More than 15 years **(>15 yr)**	29
Work directly with Rangeland owners	Yes **(W/owner)**	65
	No **(Not w/owner)**	19

CORRAL SITE EVALUATIONS BY PARTICIPANT CURRENT EMPLOYER.
Figures 34 - 41 represent the breakdown of site evaluations of the corral sites (Figure 14) based upon the participants current employer. Table 2 defines acronyms utilized in the figures.

Relative to other agencies, more Regional Water Quality Control Board (RWQCB) staff felt these corrals were not a threat to water resources (20%), while all university staff present felt the corrals were a risk to water quality. Overall, there was close agreement (>80%) that the corrals are a risk to water quality. Interestingly though, NRCS and RCD who feel most strongly that the threat posed can only be removed by relocation (32 and 19%, respectively).

Figure 34. Is this corral a threat to water resources?

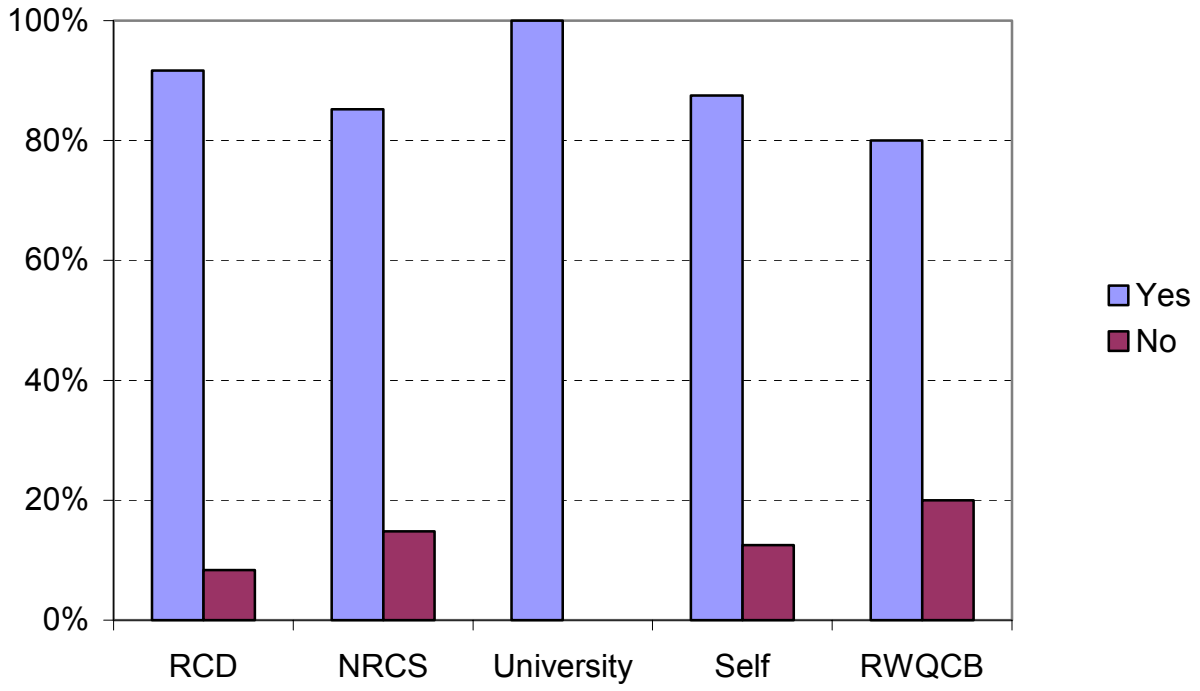


Figure 35. Mean threat rating (0=none, 5=extreme) of this corral to each water resource attribute.

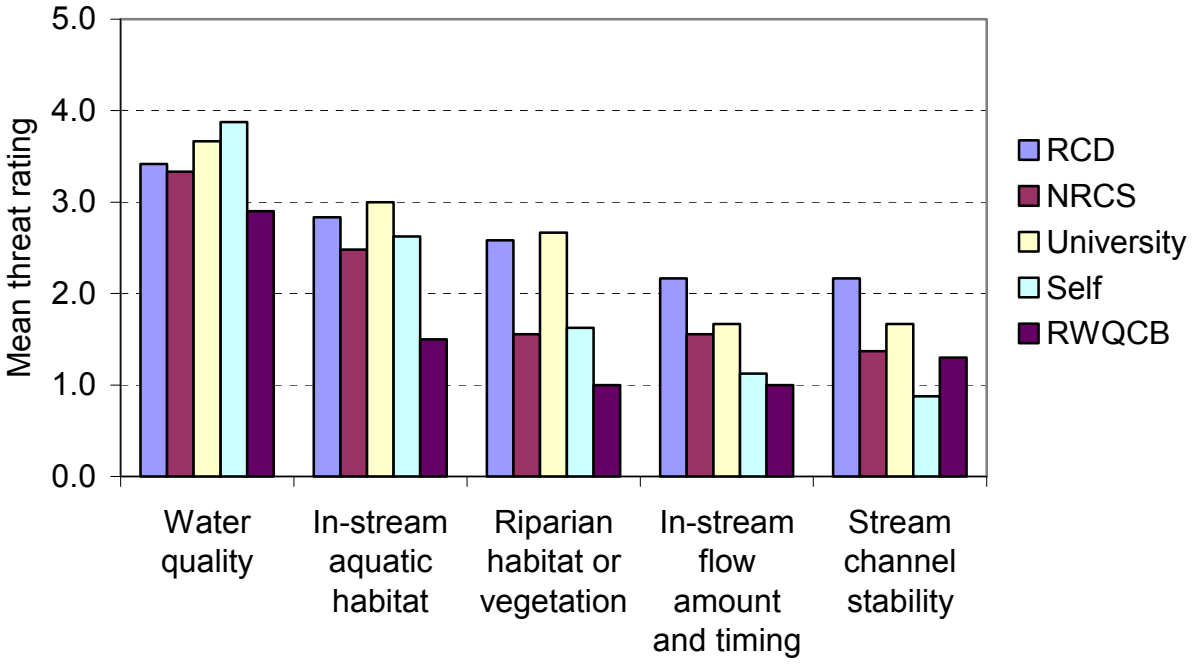


Figure 36. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RCD)**

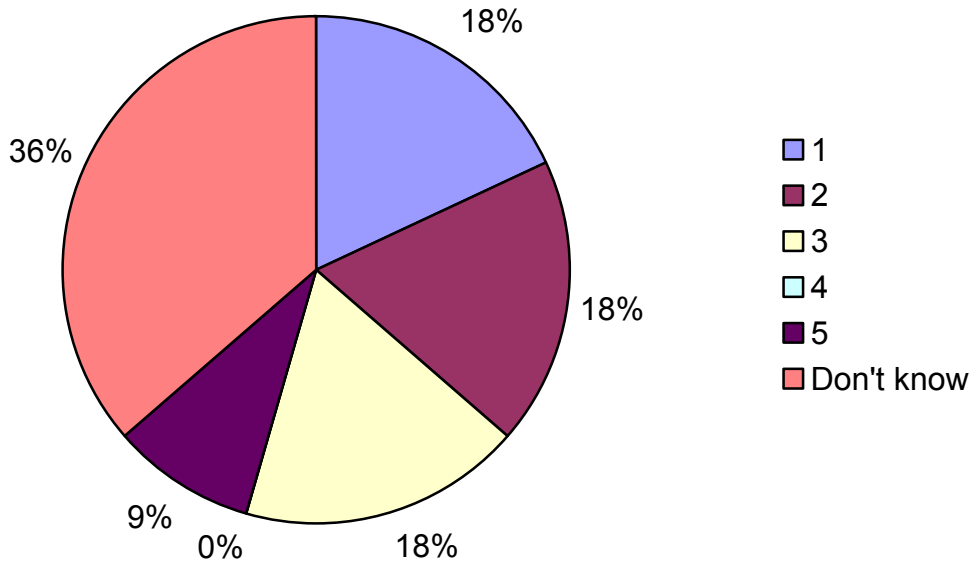


Figure 37. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRCS)**

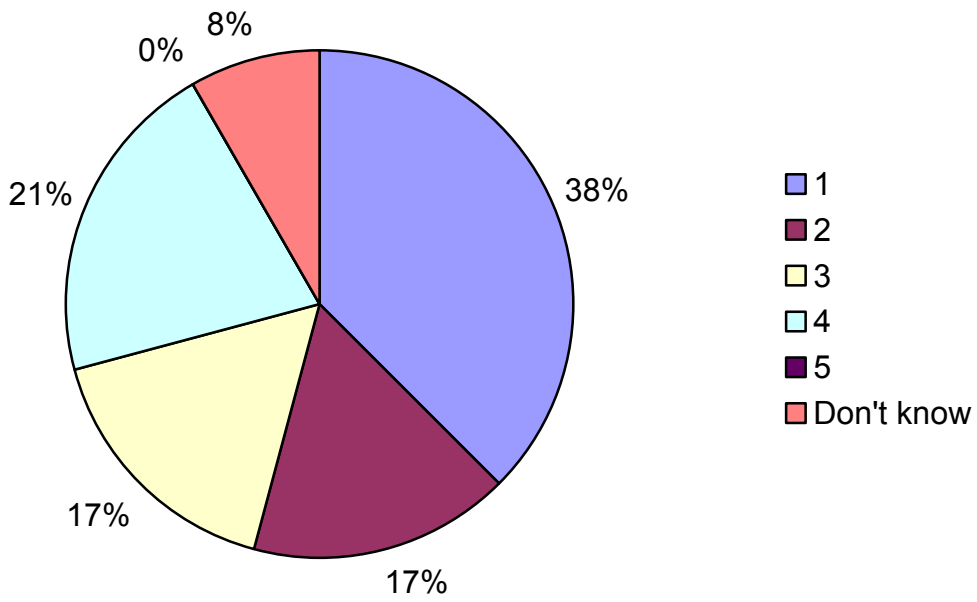


Figure 38. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(University)**

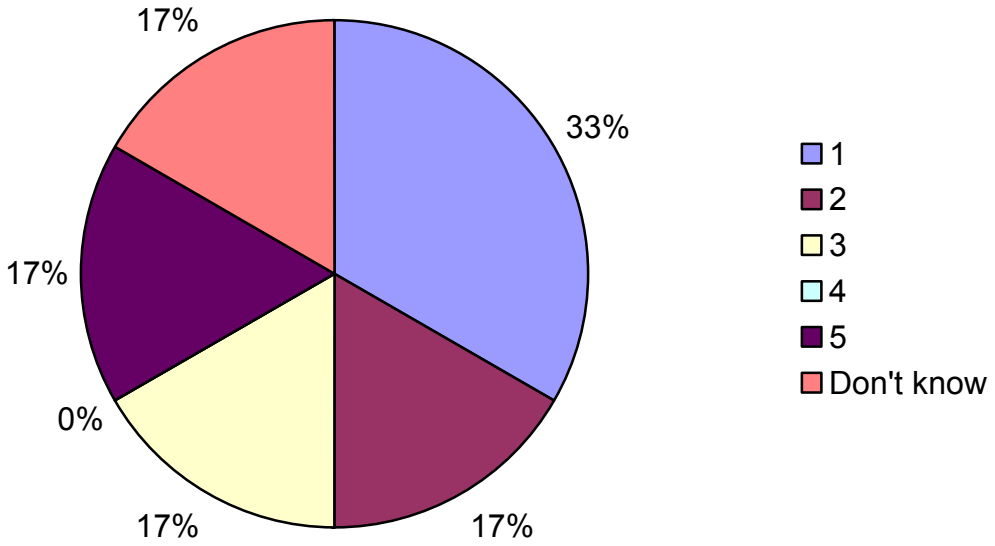


Figure 39. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(Self)**

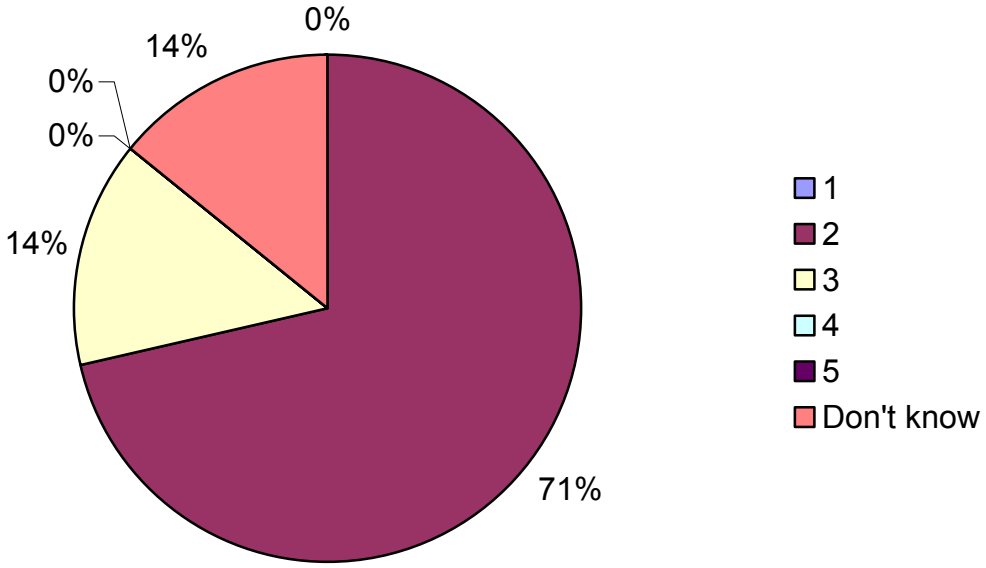


Figure 40. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RWQCB)**

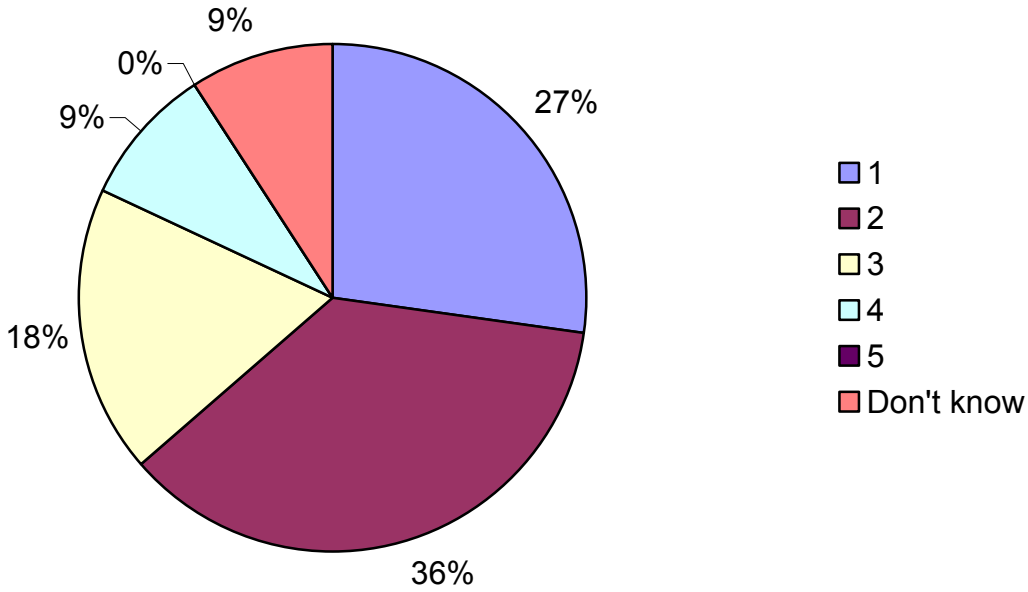
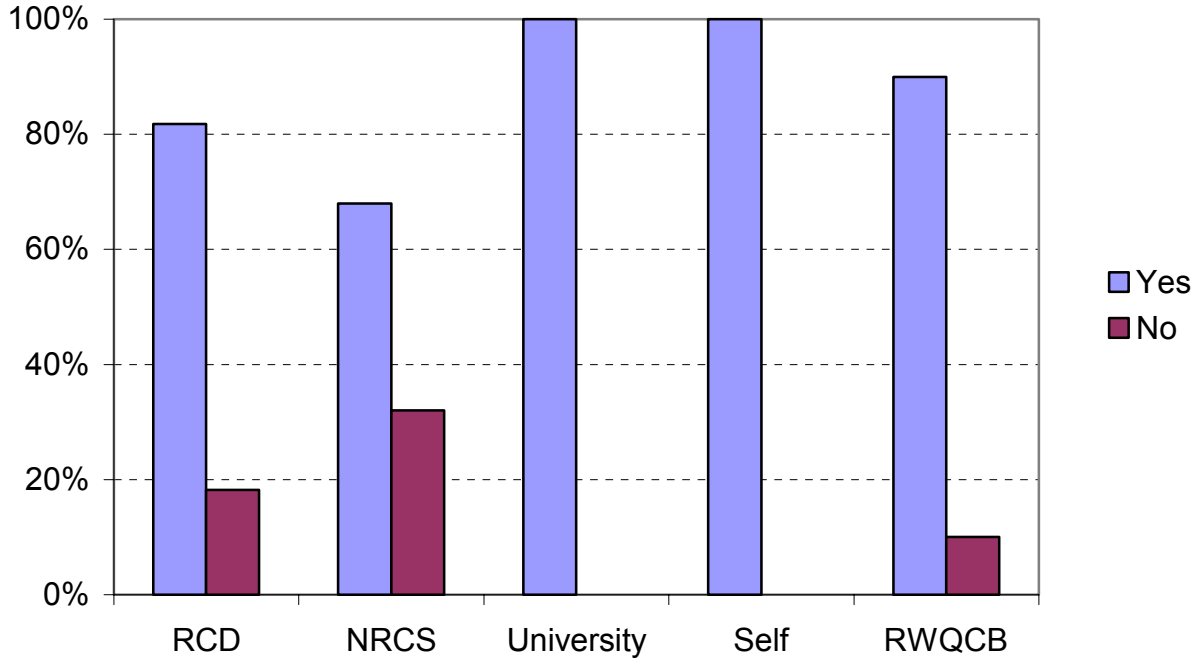


Figure 41. Can the management at this corral be corrected sufficiently to protect water resource and keep the corral in place?



CORRAL SITE EVALUATIONS BY PARTICIPANT EDUCATION.
Figures 42 - 47 represent the breakdown of site evaluations of the corral sites (Figure 14) based upon the participants educational background. Table 2 defines acronyms utilized in the figures, and grouping of education background into natural resources utilization (NRuse), natural resources protection (NRpro), and physical sciences (PhysiSci).

A greater percentage of participants with natural resources protection degrees felt the corrals were a threat to water resources. However, this trend is reversed when the question is can the threat be removed without relocating the corral. 31% of natural resource use degree participants felt the corral must be relocated to remove the risk to water quality, while only 8% of natural resource protection degree participants felt the same. Natural resources use participants have less confidence in the ability of vegetated buffers and other activities to attenuate pollutant transport from the corral to the stream.

Figure 42. Is this corral a threat to water resources?

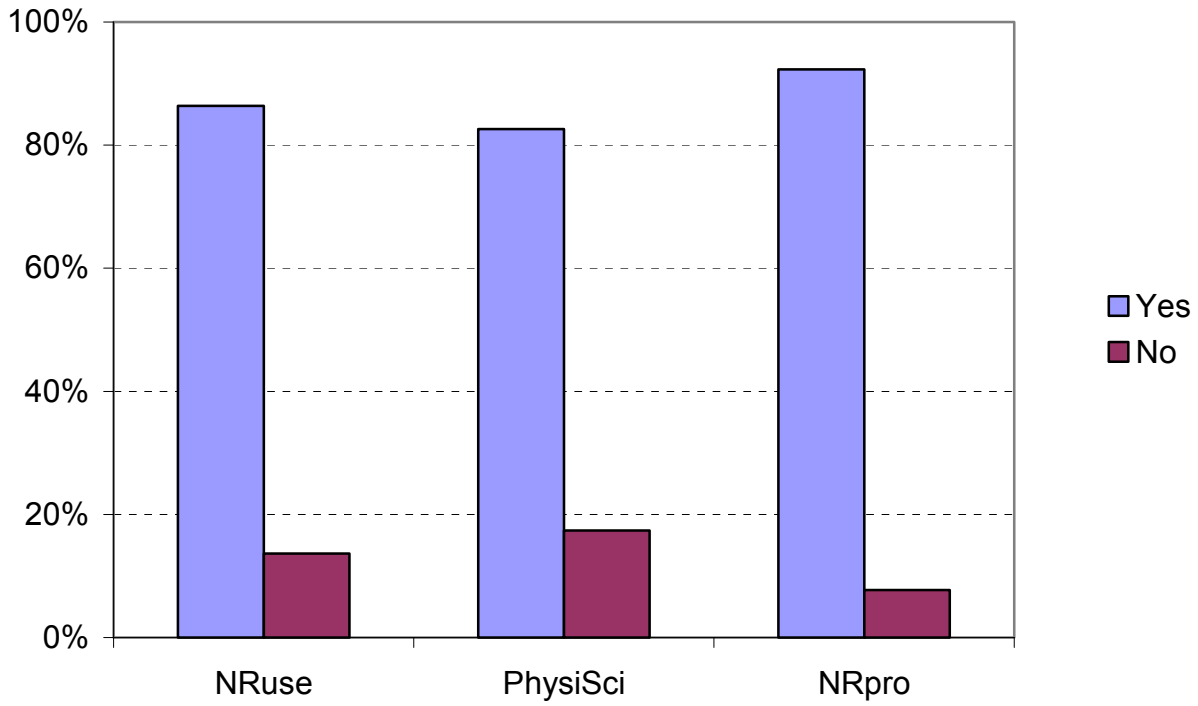


Figure 43. Mean threat rating (0=none, 5=extreme) of this corral to each water resource attribute.

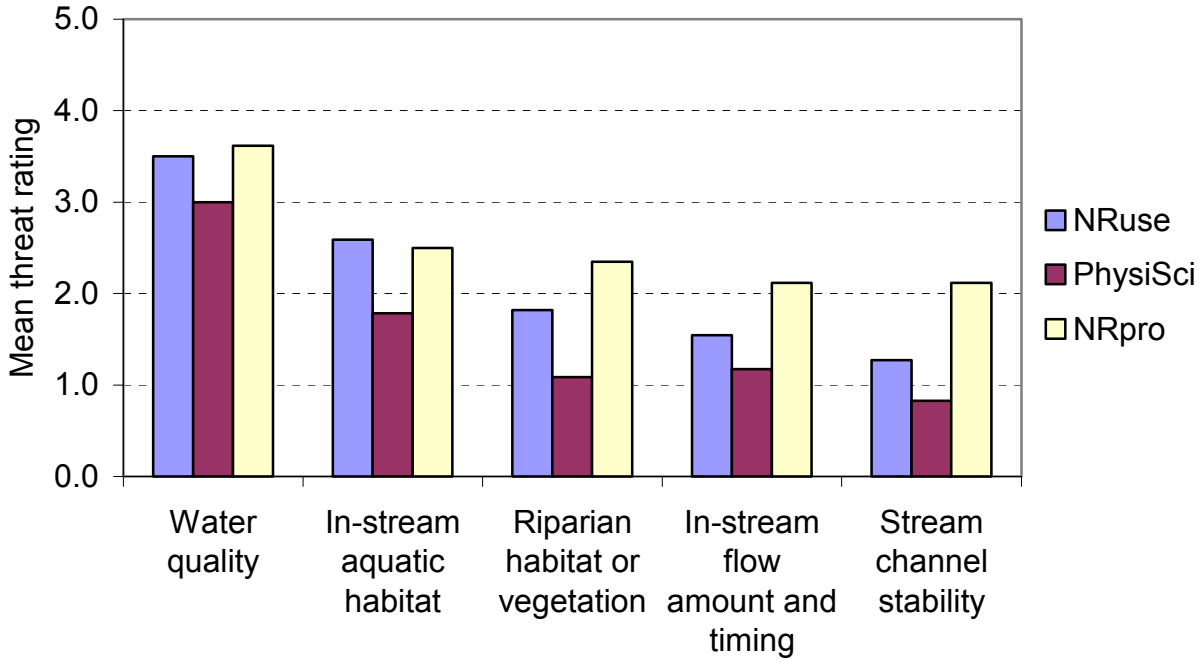


Figure 44. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRuse)**

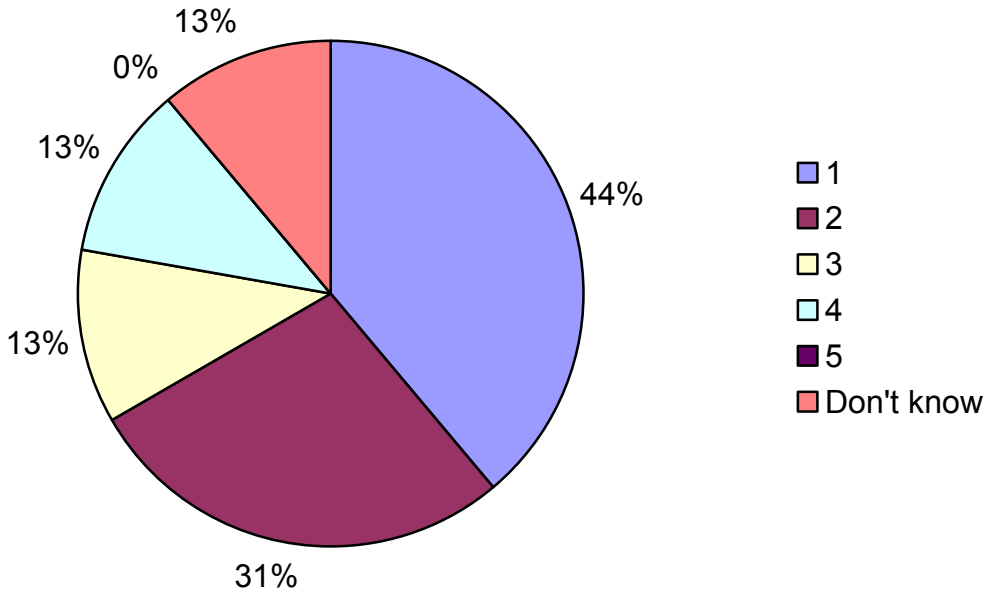


Figure 45. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(PhysiSci)**

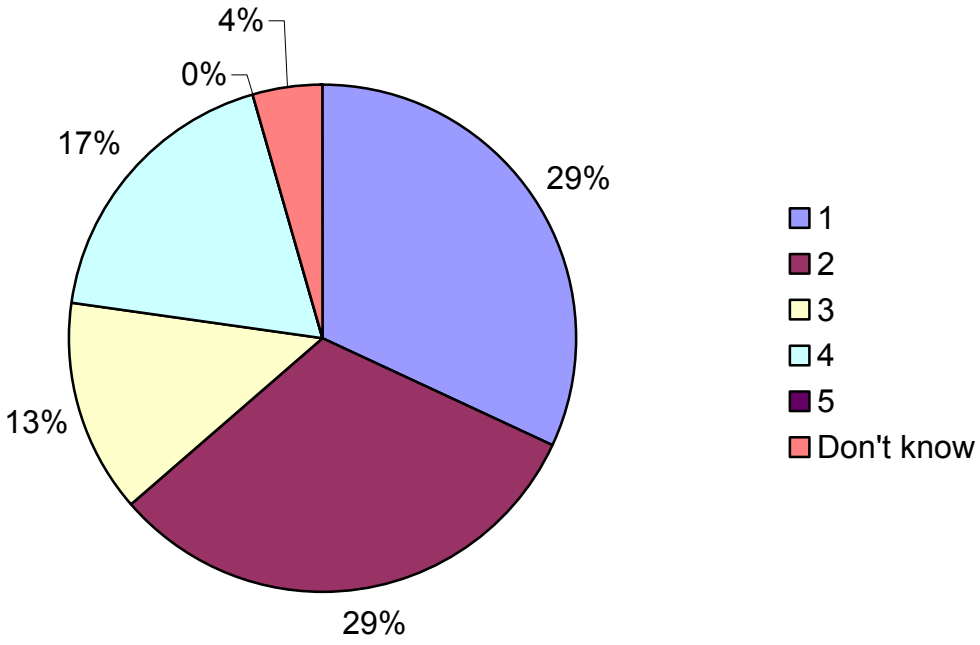


Figure 46. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRpro)**

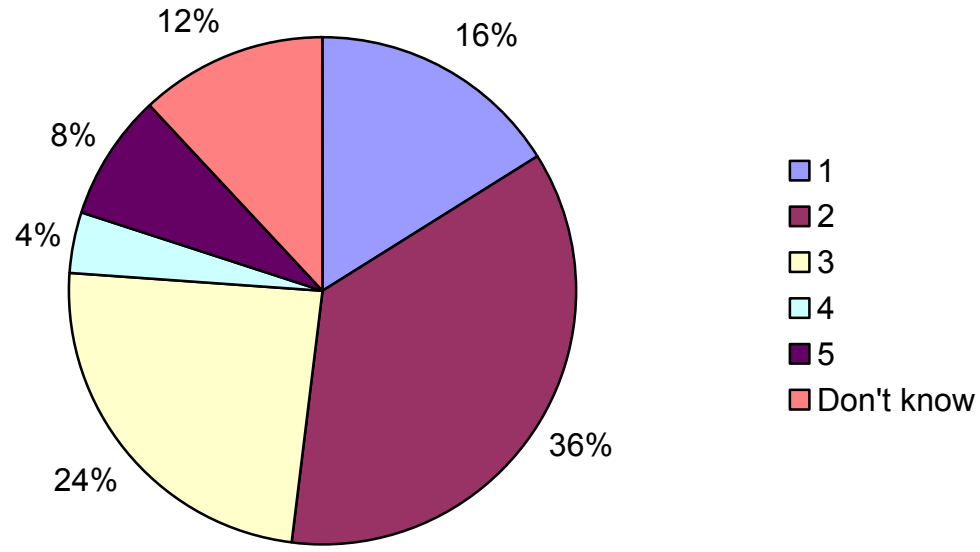
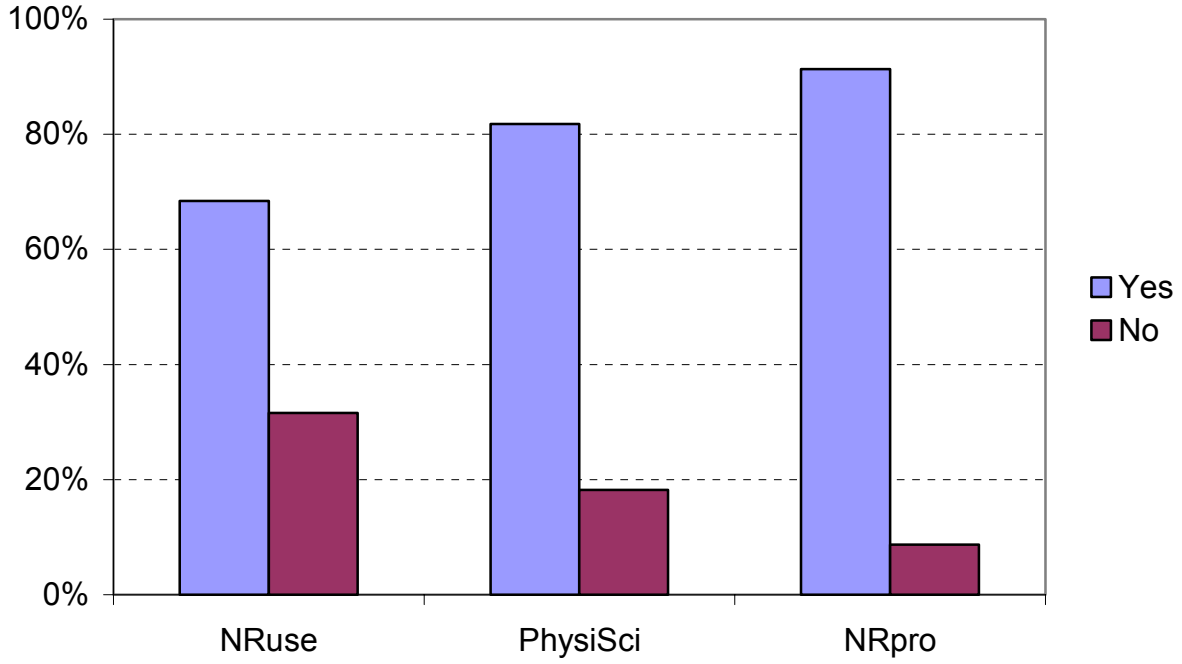


Figure 47. Can the management at this corral be corrected sufficiently to protect water resource and keep the corral in place?



CORRAL SITE EVALUATIONS BY PARTICIPANT EXPERIENCE.
Figures 48 - 54 represent the breakdown of site evaluations of the corral sites (Figure 14) based upon the participants experience. Table 2 defines acronyms utilized in the figures.

As participant experience increases, there was a slight increase in the percentage who feels the corrals are a threat to water resources ; however, this reverses itself for the potential to reduce the impact with management.

Figure 48. Is this corral a threat to water resources?

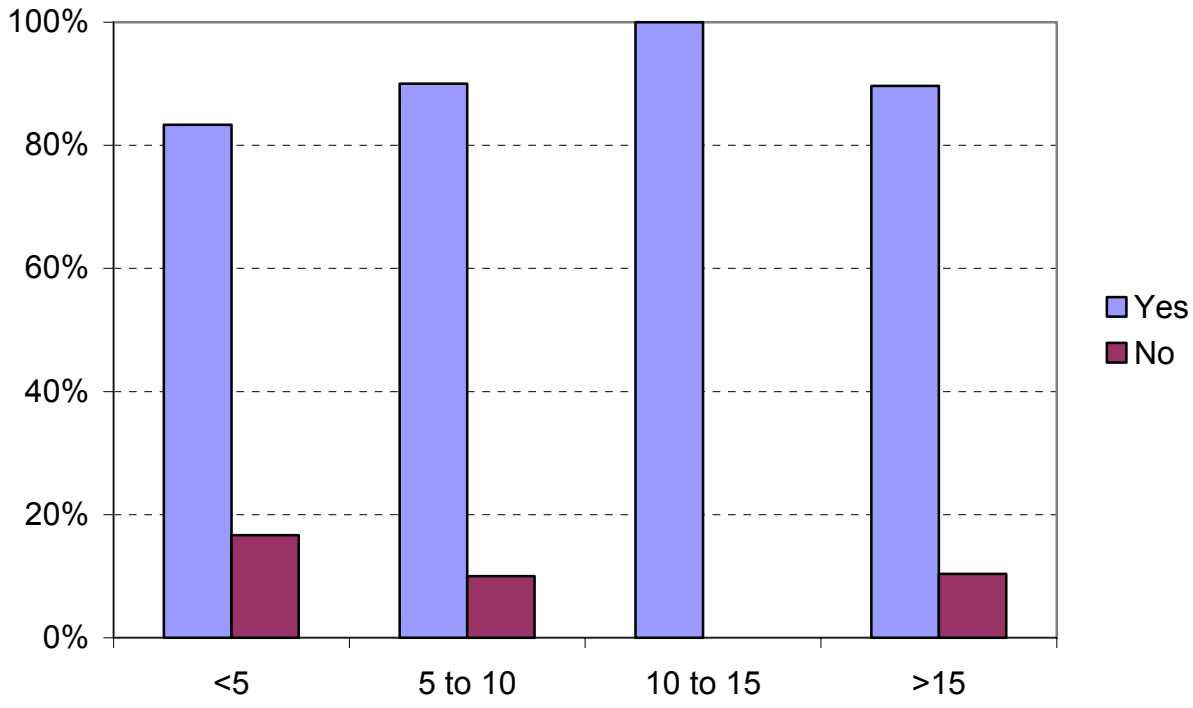


Figure 49. Mean threat rating (0=none, 5=extreme) of this corral to each water resource attribute.

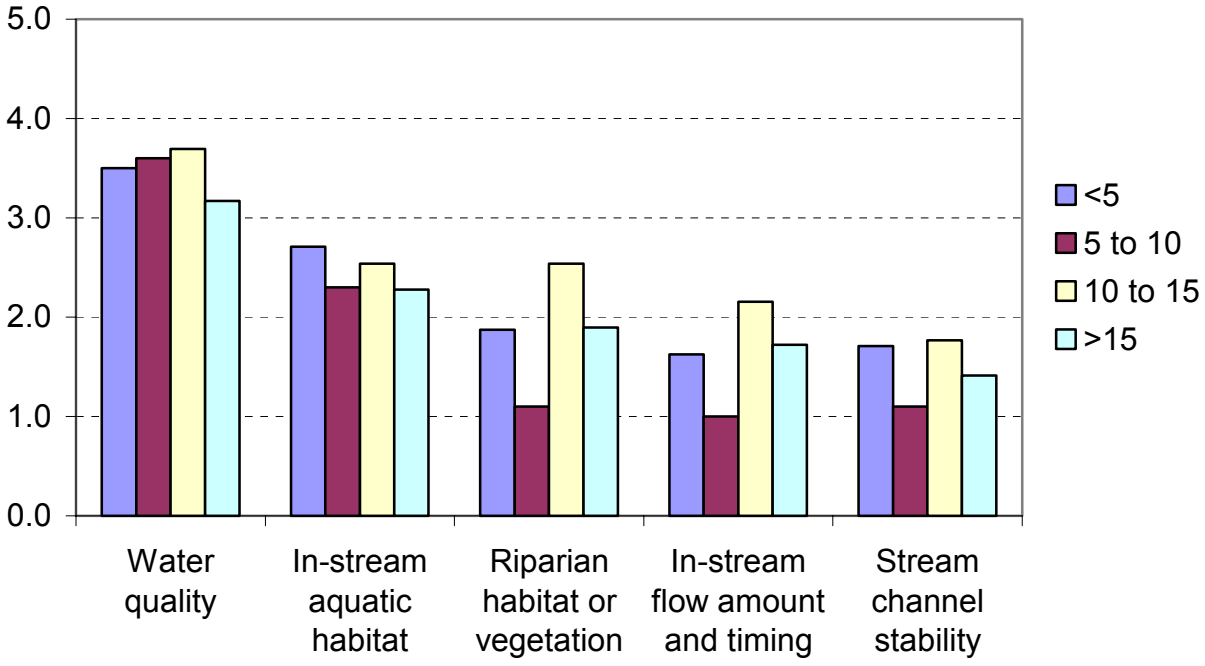


Figure 50. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(<5)**

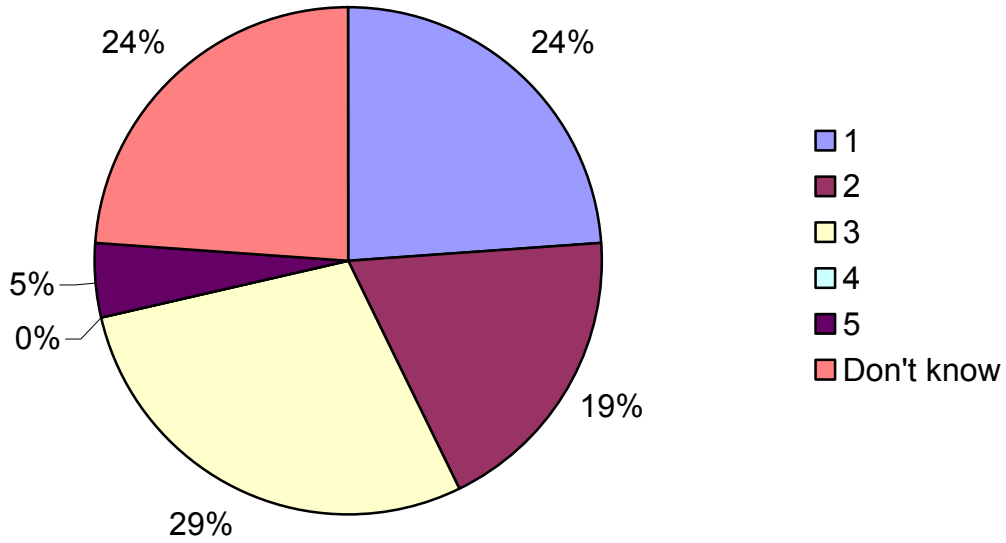


Figure 51. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(5 to 10)**

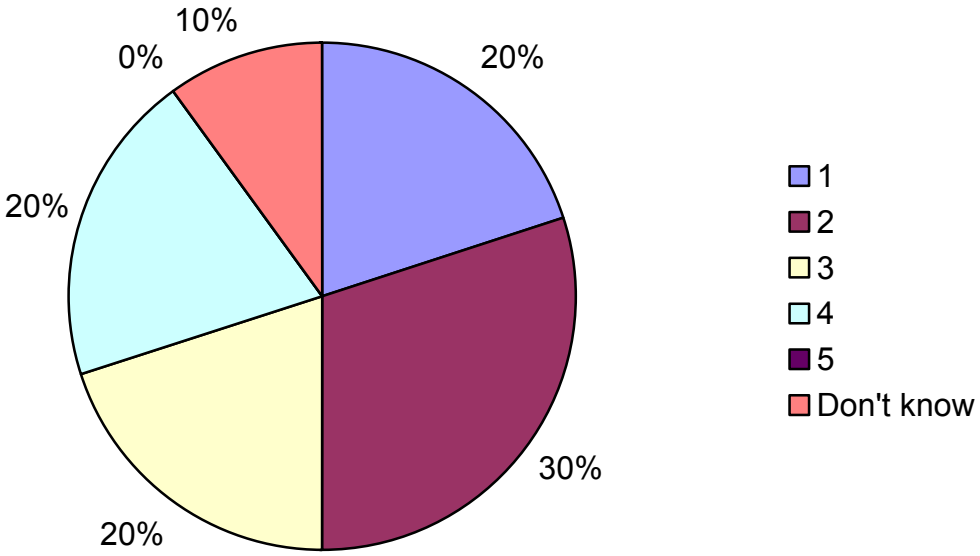


Figure 52. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(10 to 15)**

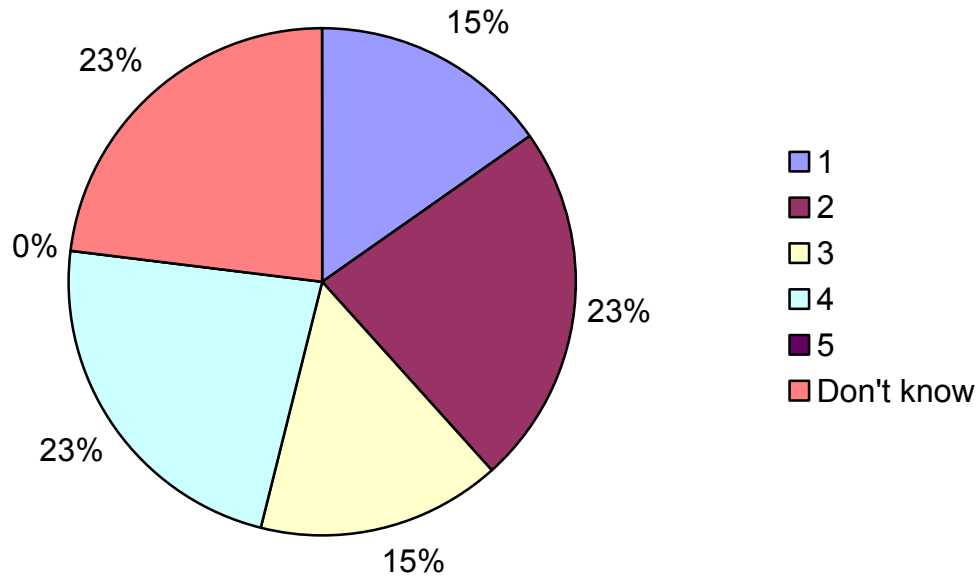


Figure 53. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(>15)**

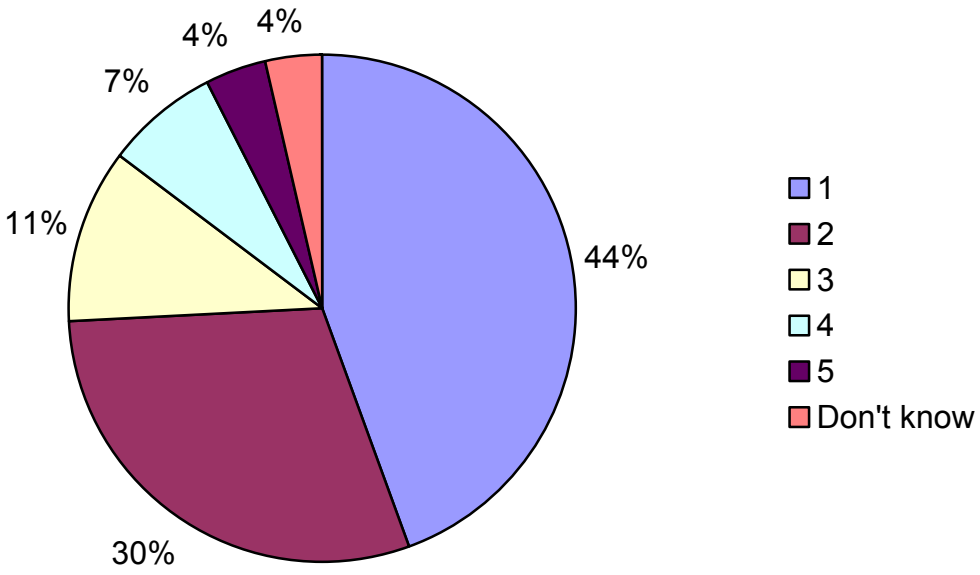
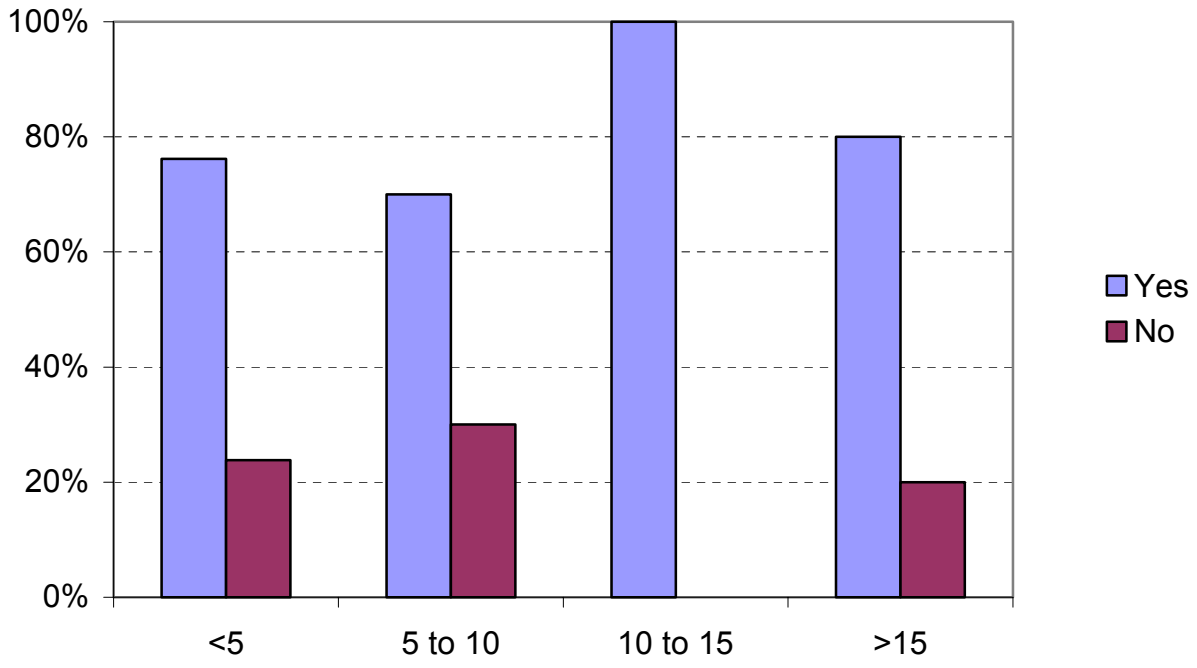


Figure 54. Can the management at this corral be corrected sufficiently to protect water resource and keep the corral in place?



CORRAL SITE EVALUATIONS BY PARTICIPANTS WHO DO AND DO NOT WORK DIRECTLY WITH LANDOWNERS.

Figures 55 - 59 represent the breakdown of site evaluations of the corral sites (Figure 14) based upon whether or not the participants work directly with landowners. Table 2 defines acronyms utilized in the figures.

There is essentially little difference in opinion between participants who work directly with landowners and those who do not.

Figure 55. Is this corral a threat to water resources?

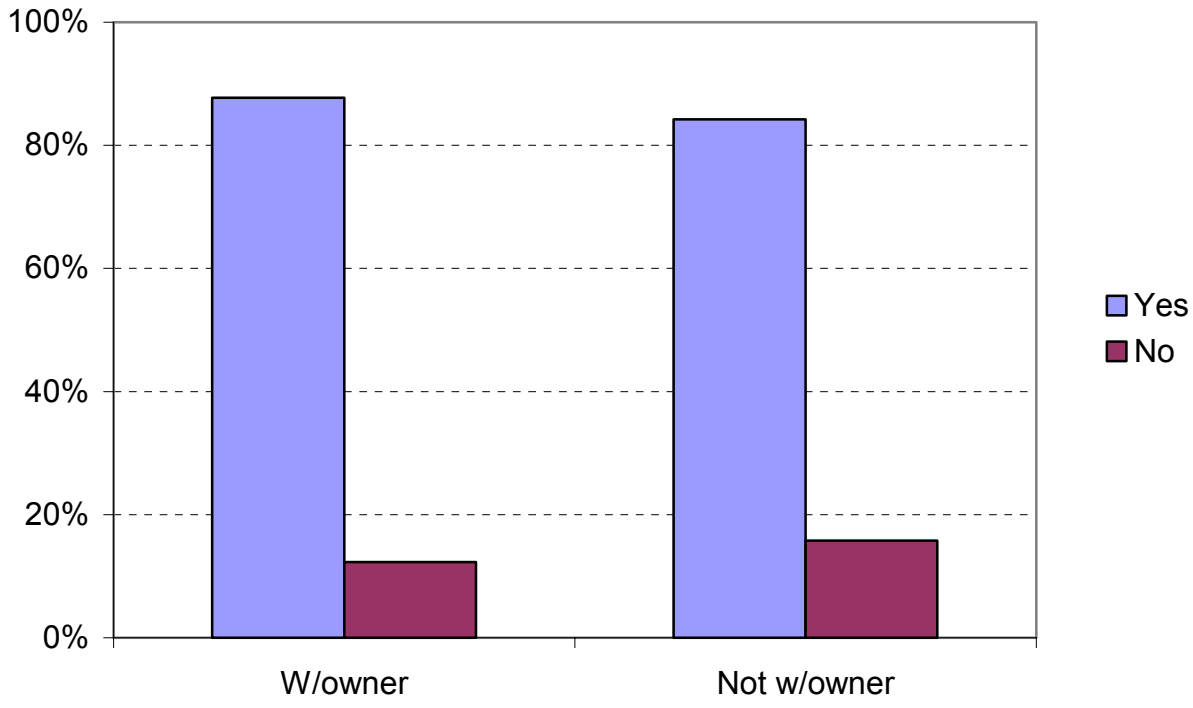


Figure 56. Mean threat rating (0=none, 5=extreme) of this corral to each water resource attribute.

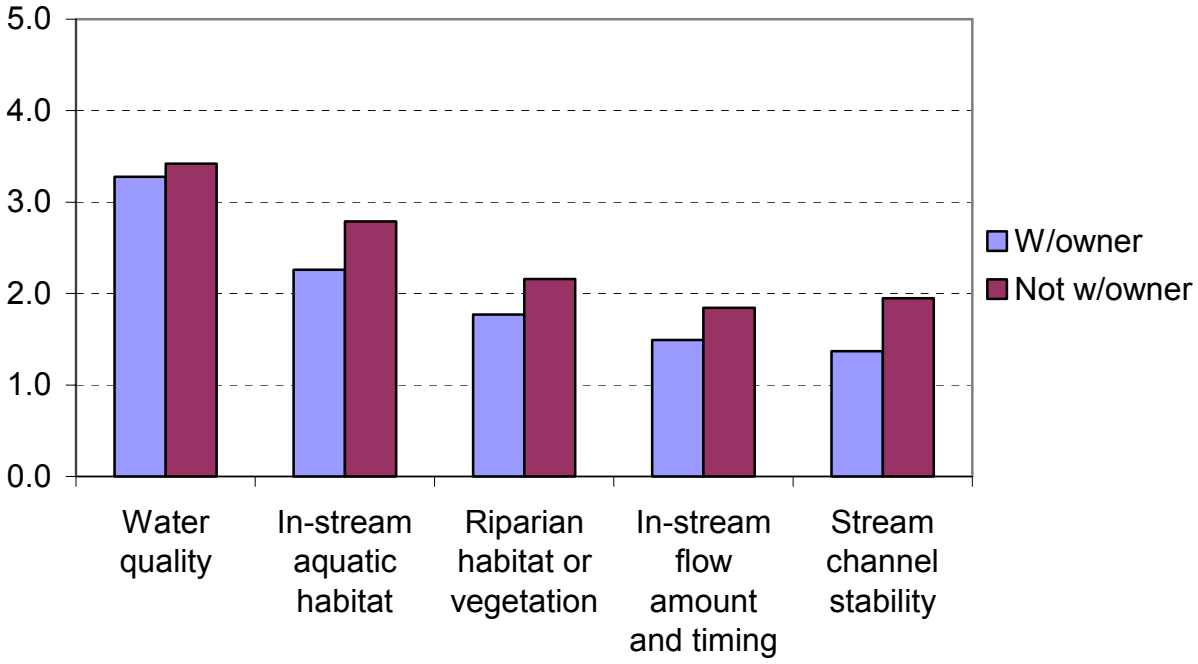


Figure 57. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (work directly with rangeland owner)

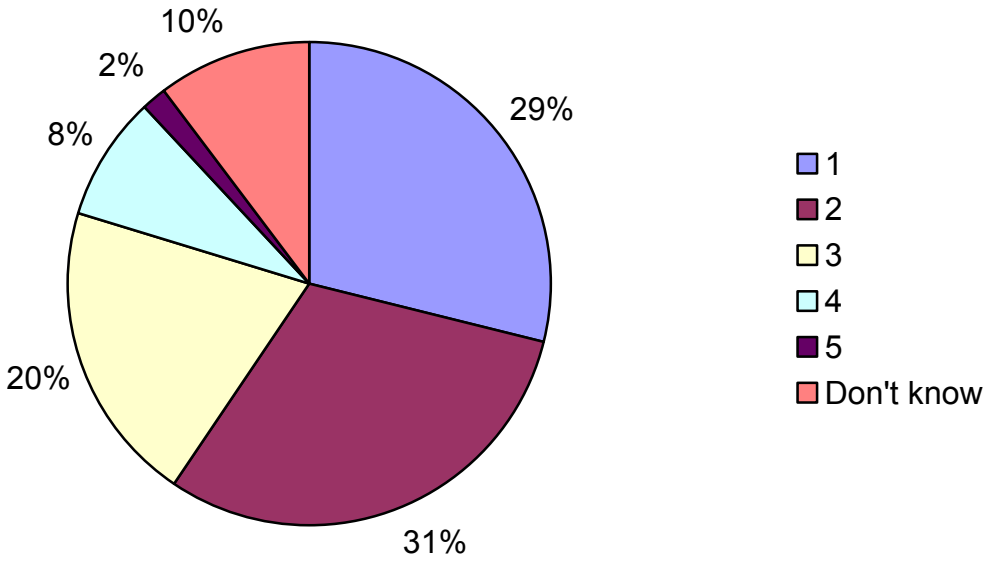


Figure 58. Rate this corral's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (don't work directly with rangeland owner)

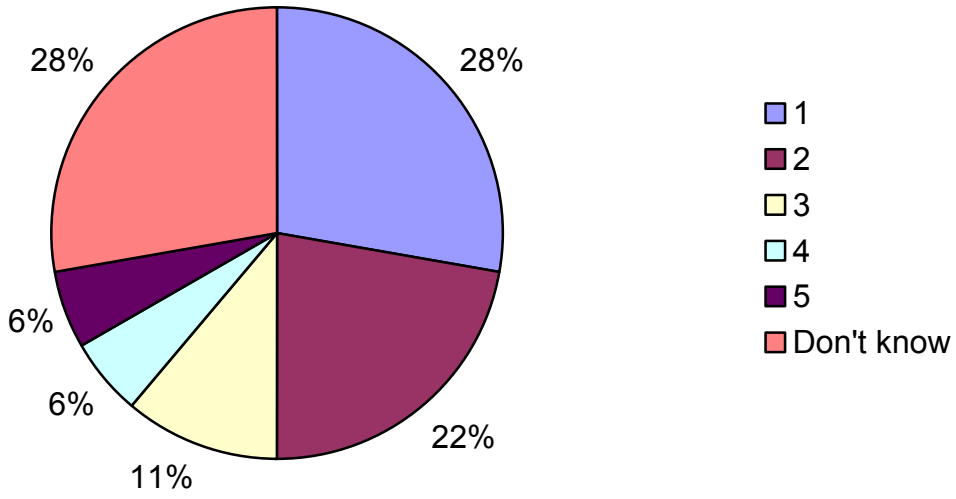


Figure 59. Can the management at this corral be corrected sufficiently to protect water resource and keep the corral in place?

SEASONAL STREAM CROSSING SITE EVALUATIONS BY PARTICIPANT CURRENT EMPLOYER.

Table 3. Demographics utilized for analysis of relationships between participant professional demographics and participant site evaluations for seasonal stream crossings.

DEMOGRAPHIC	LEVEL	SAMPLE SIZE
Employer	Resources Conservation District **(RCD)**	16
	Natural Resources Conservation Service **(NRCS)**	33
	University	9
	Self Employed **(Self)**	13
	Regional Water Quality Control Board **(RWQCB)**	13
Educational Background	Natural Resources Utilization **(NRuse)**; includes Agriculture, Agricultural Engineering, Forestry, Range Science, Animal Science, Watershed Management, Aquaculture	26
	Physical Sciences **(PhysiSci)**; includes Engineering, Hydrology, Soil Science, Geology, Geography, Biochemistry	26
	Natural Resources Protection **(NRpro)**; includes Environmental/Natural Resources-Biology, Environmental Science, Natural Resources, Wildlife & Fisheries, Ecology, Plant Science, Wildlife Management, Zoology	43
Total years experience as Natural Resource Professional	Less than 5 years **(<5 yr)**	34
	5 to 10 years **(5 to 10 yr)**	14
	10 to 15 years **(10 to 15 yr)**	18
	More than 15 years **(>15 yr)**	36
Work directly with Rangeland owners	Yes **(W/owner)**	85
	No **(Not w/owner)**	26

Figures 60 - 67 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 19) based upon the participants current employer. Table 3 defines acronyms utilized in the figures.

The most evident result of this analysis is that University staff were least likely (43% no) to see the crossings as a threat. Also, RCD and NRCS staff were least confident (20% and 16% no, respectively) that the effects of this crossing could be mitigated.

Figure 60. Is this seasonal stream crossing a threat to water resources?

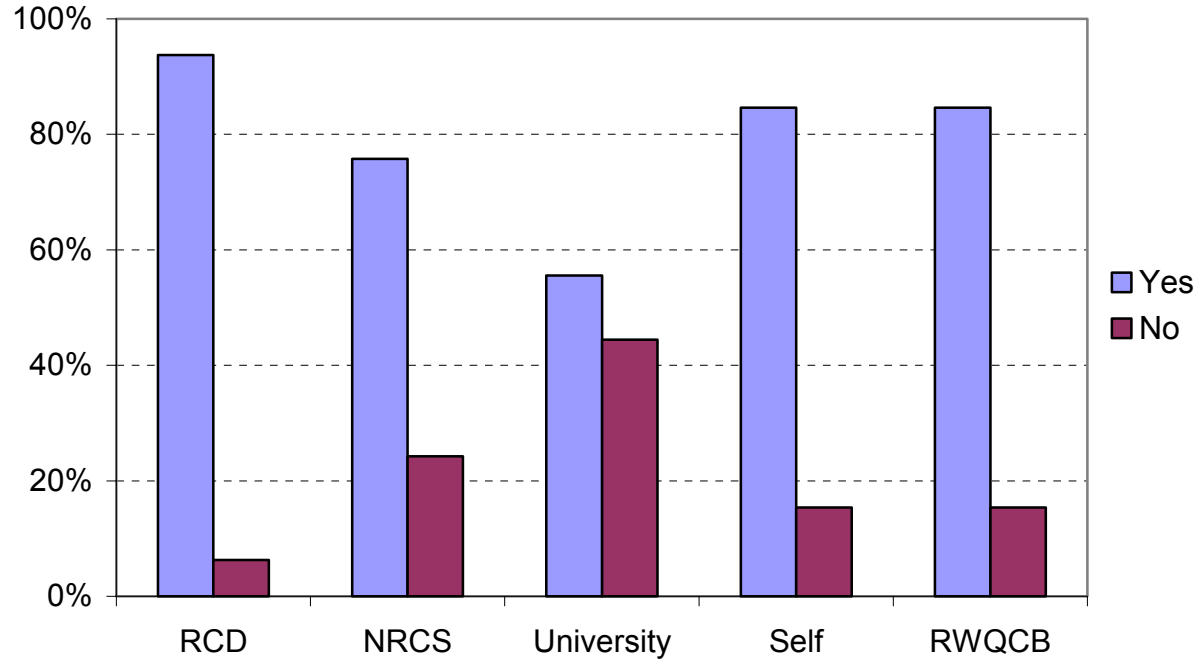


Figure 61. Mean threat rating (0=none, 5=extreme) of this seasonal stream crossing to each water resource attribute.

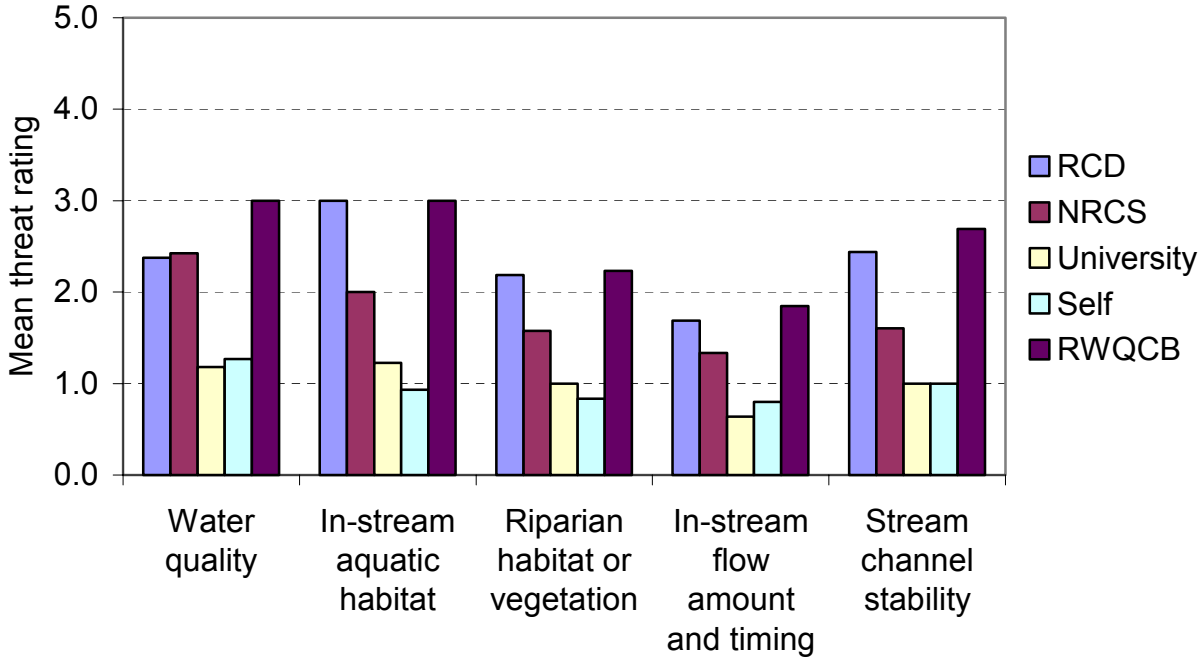


Figure 62. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RCD)**

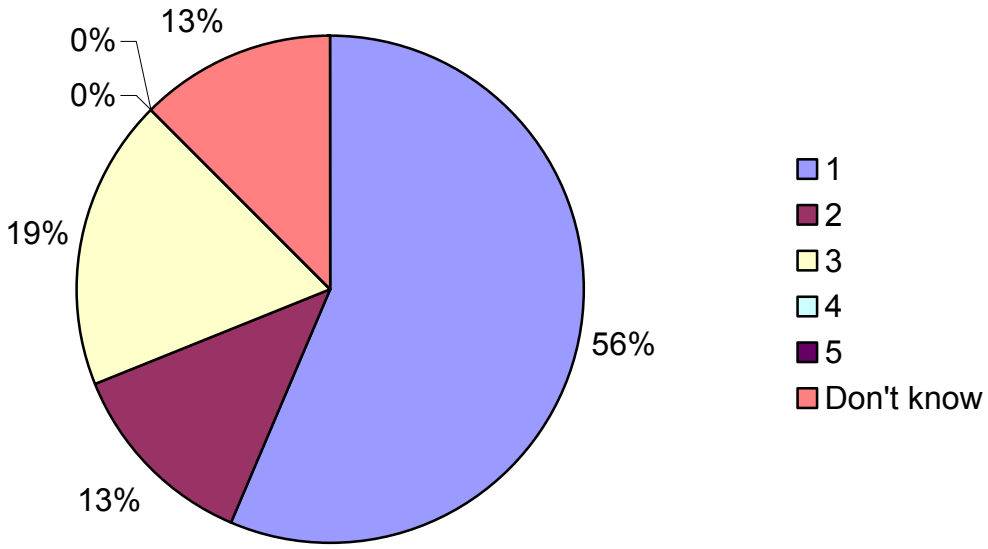


Figure 63. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRCS)**

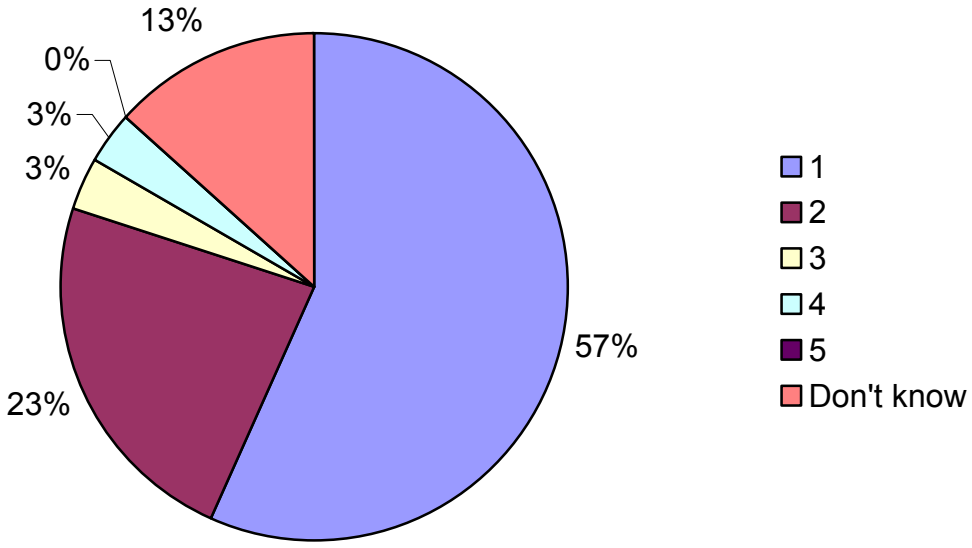


Figure 64. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (University)

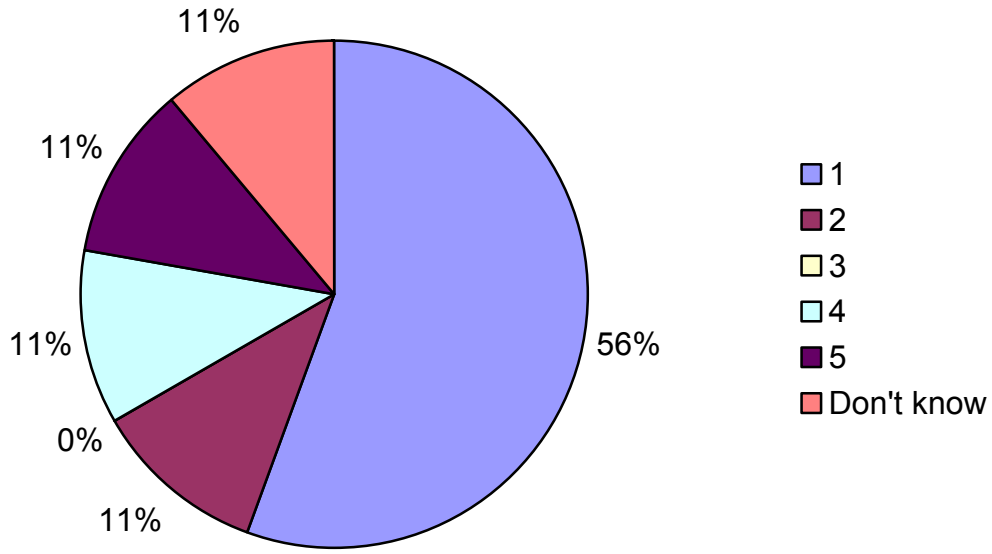


Figure 65. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(Self)**

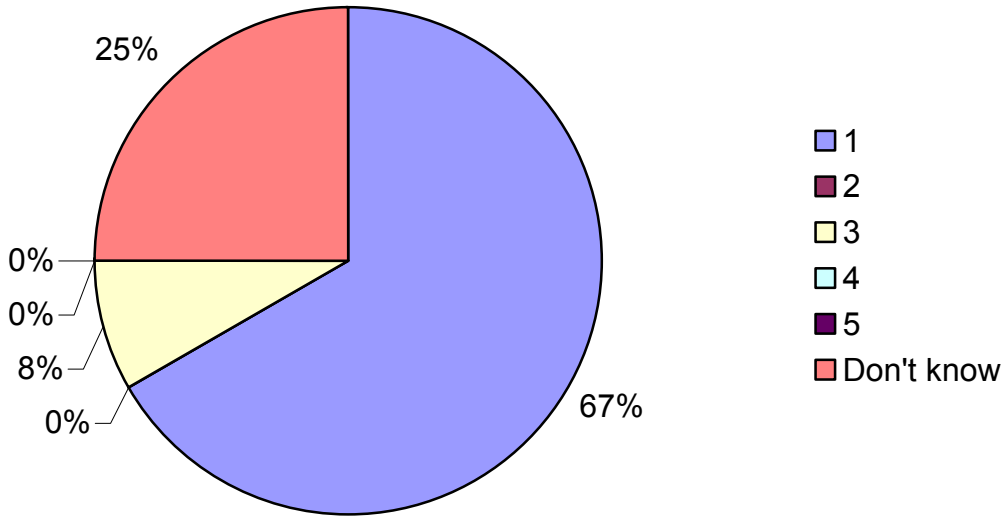


Figure 66. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (RWQCB)

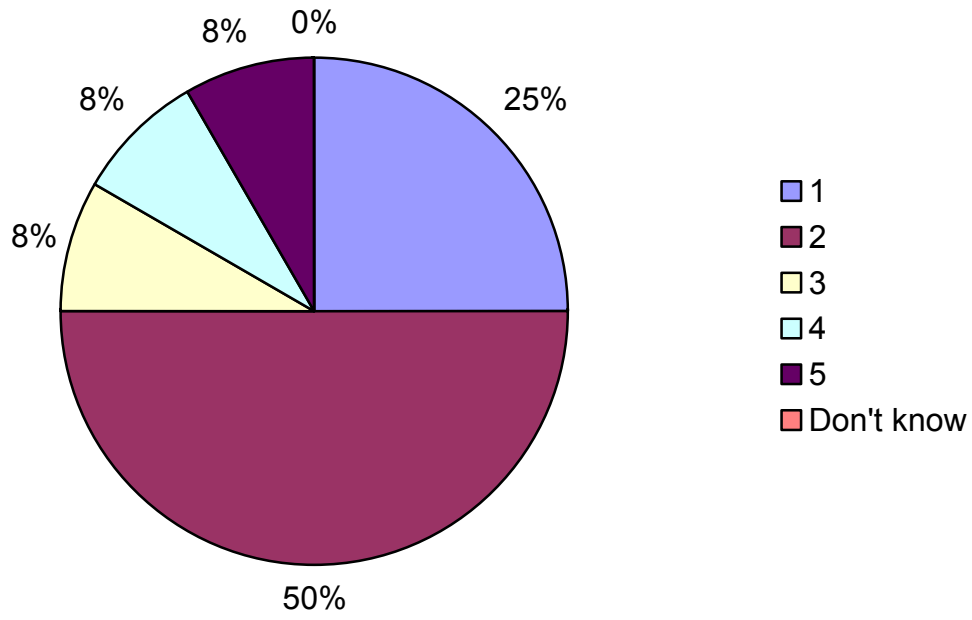
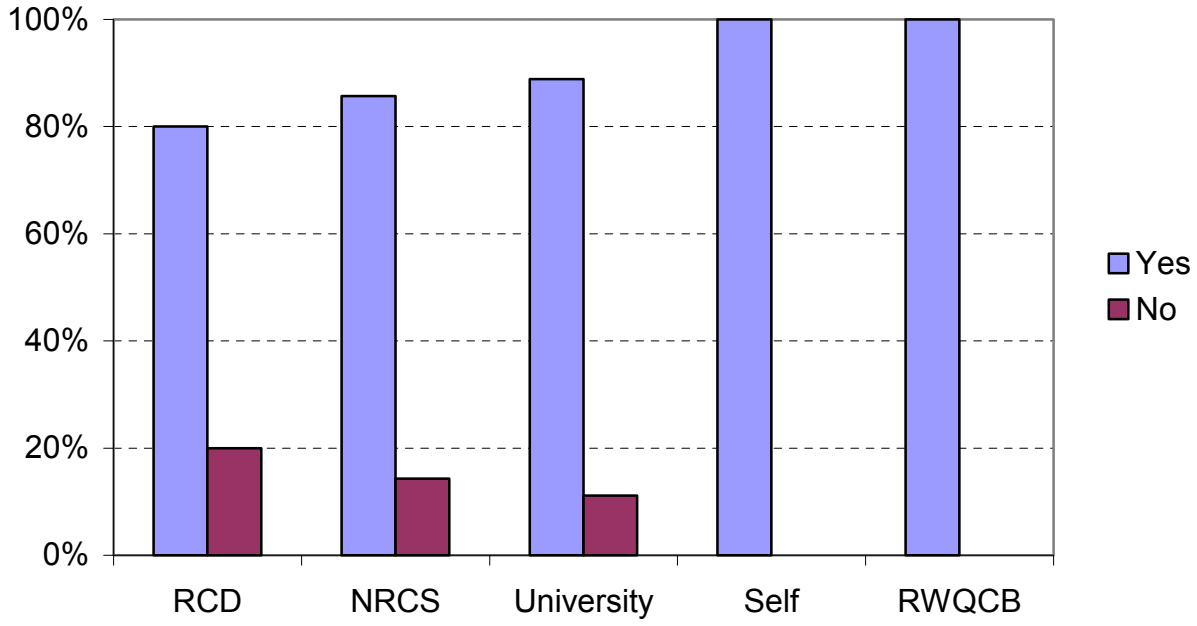


Figure 67. Can the management at this seasonal stream crossing be corrected sufficiently to protect water resource and keep the corral in place?



SEASONAL STREAM CROSSING SITE EVALUATIONS BY PARTICIPANT EDUCATION.
Figures 68 - 73 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 19) based upon the participants educational background. Table 3 defines acronyms utilized in the figures.

Participants with natural resources utilization educational degrees clearly were less likely (39% no) to see these stream crossings as threats to water resources. Participants with physical sciences degrees were least certain (18% no) that the impacts could be mitigated.

Figure 68. Is this seasonal stream crossing a threat to water resources?

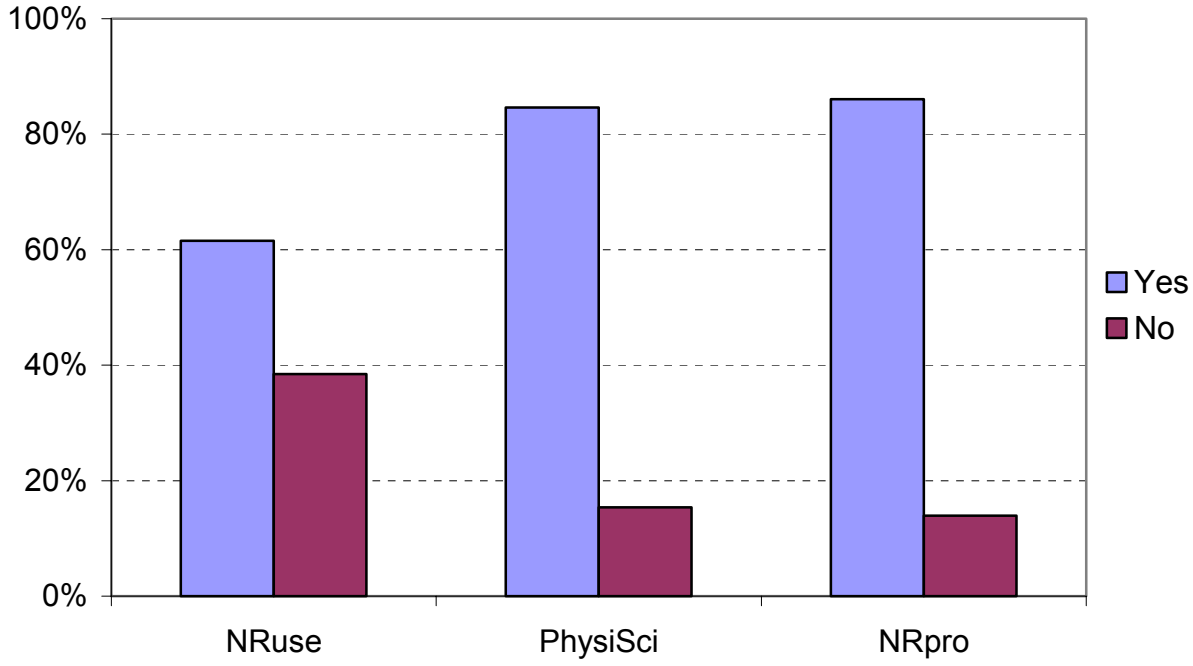


Figure 69. Mean threat rating (0=none, 5=extreme) of this seasonal stream crossing to each water resource attribute.

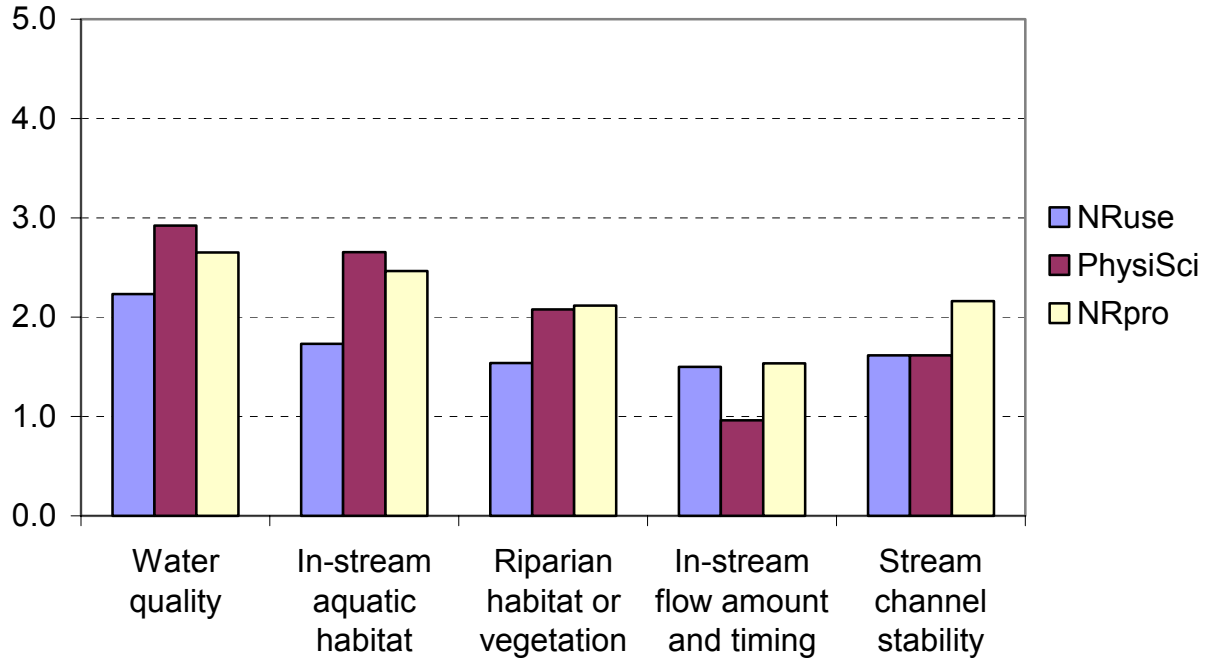


Figure 70. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRuse)**

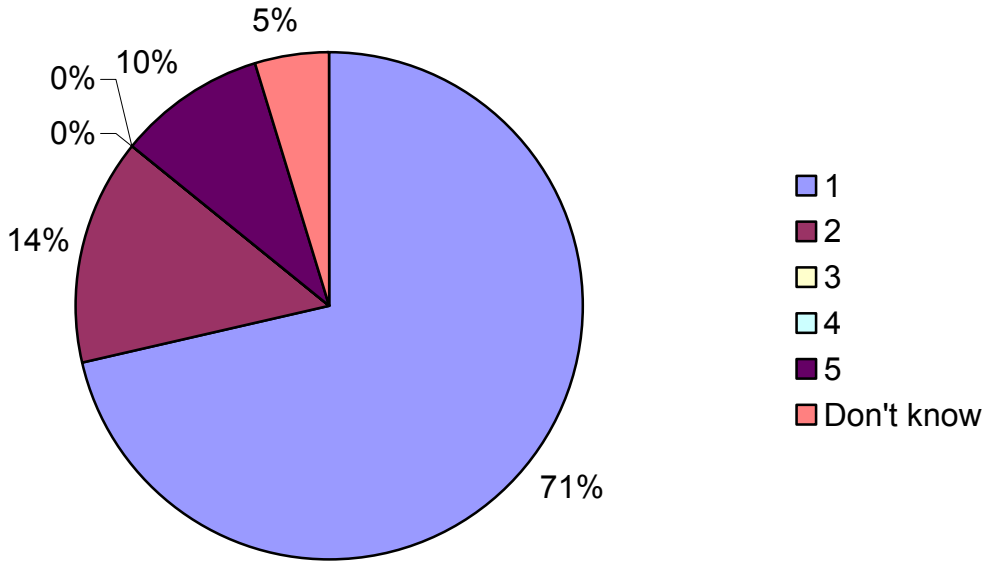


Figure 71. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (PhysiSci)

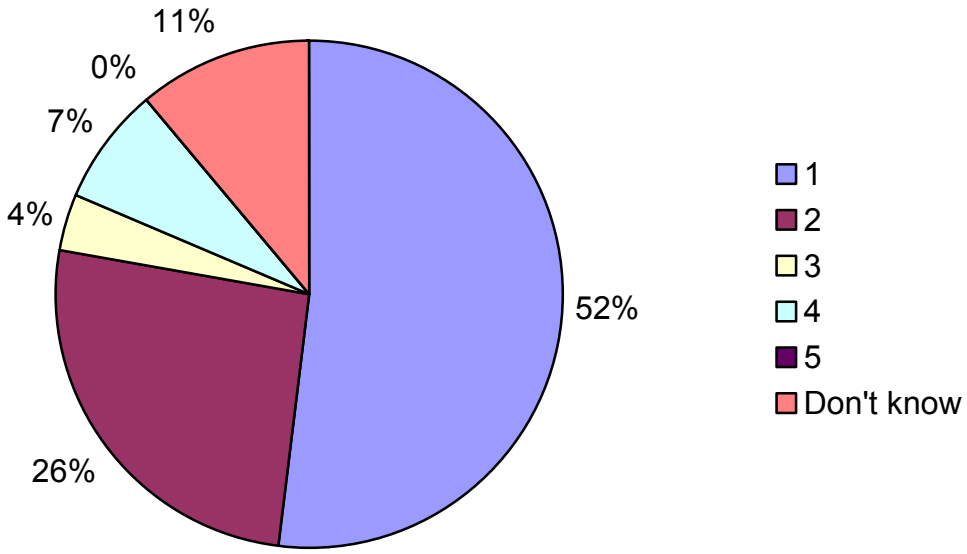


Figure 72. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, (Nrpro)

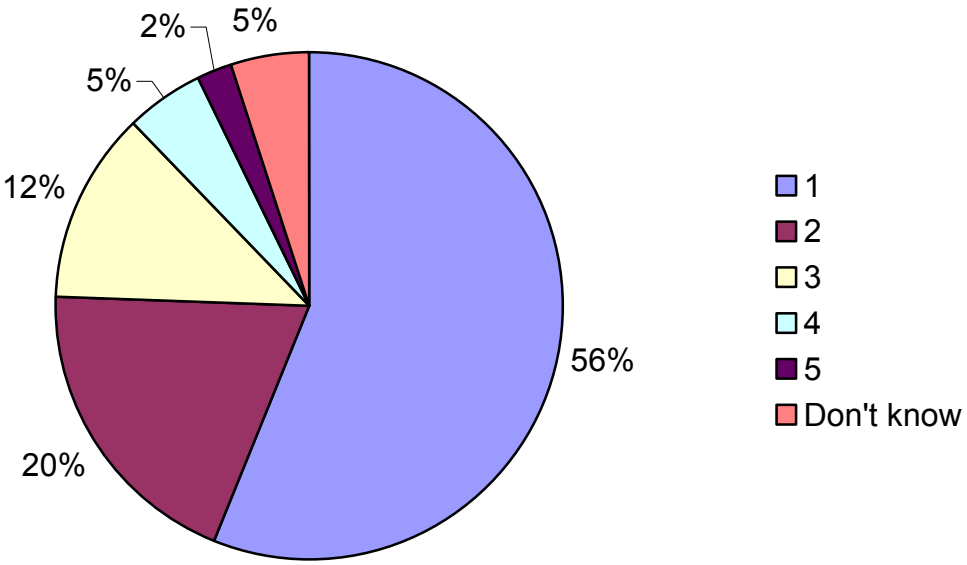
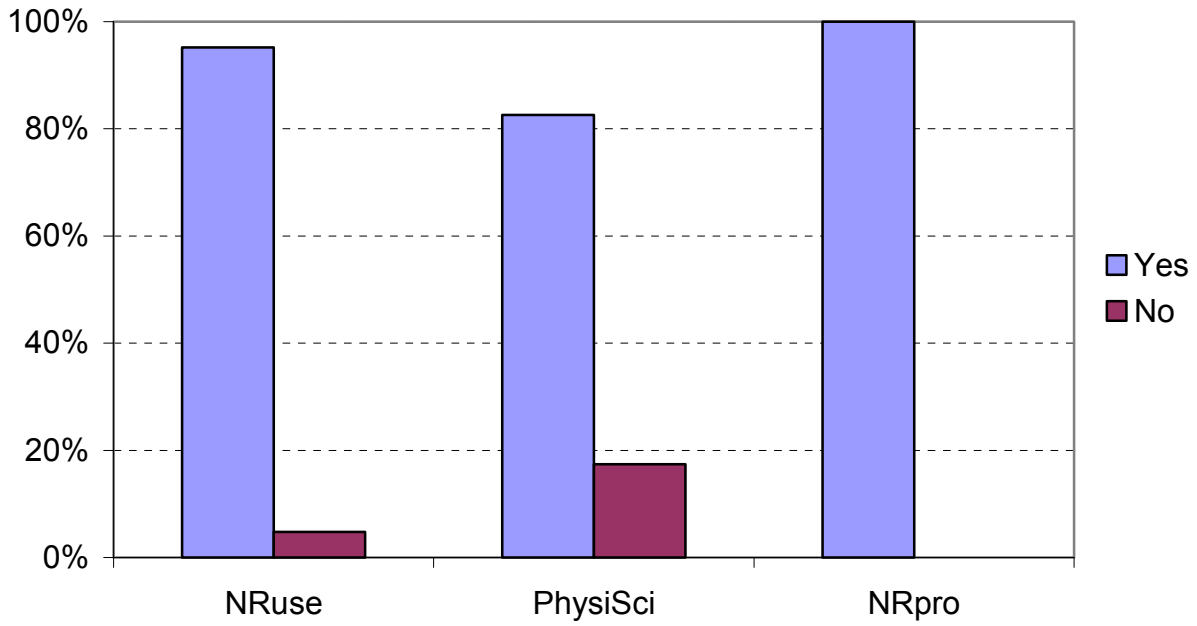


Figure 73. Can the management at this seasonal stream crossing be corrected sufficiently to protect water resource and keep the corral in place?



SEASONAL STREAM CROSSING SITE EVALUATIONS BY PARTICIPANT EXPERIENCE.
Figures 74 - 80 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 19) based upon the participants experience. Table 3 defines acronyms utilized in the figures.

Participants with more than 5 years experience had similar views on if the crossing was a threat to water resources (18-21% no) while those with less than 5 years experience were more certain the crossing was a threat (5% no).

Figure 74. Is this seasonal stream crossing a threat to water resources?

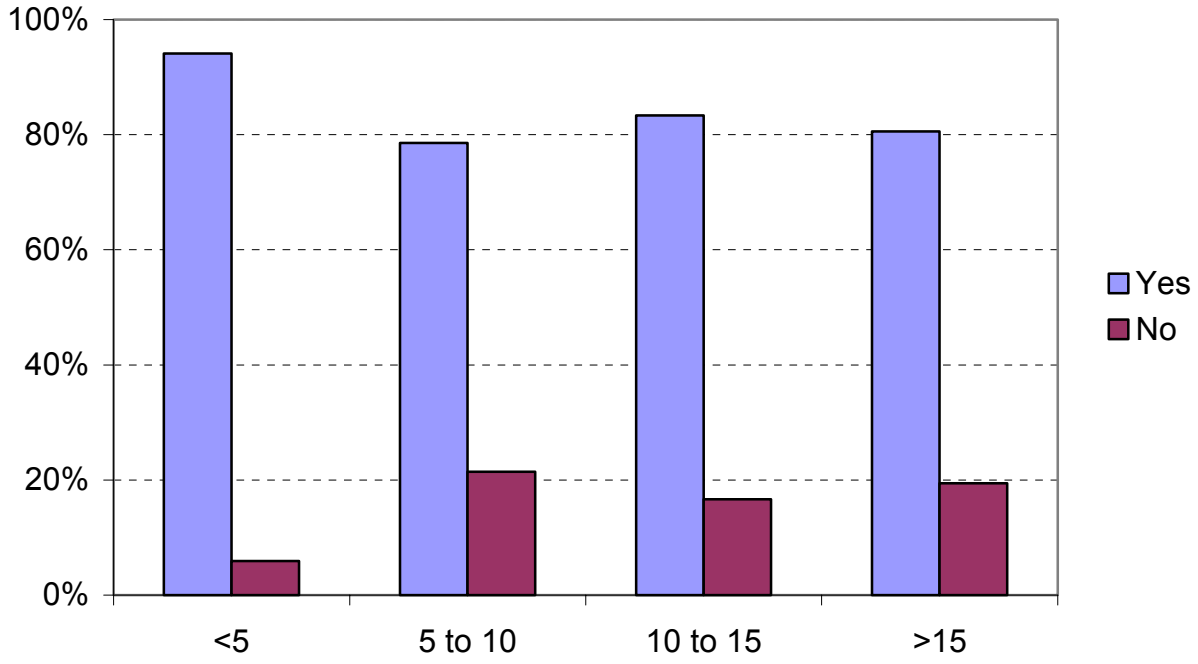


Figure 75. Mean threat rating (0=none, 5=extreme) of this seasonal stream crossing to each water resource attribute.

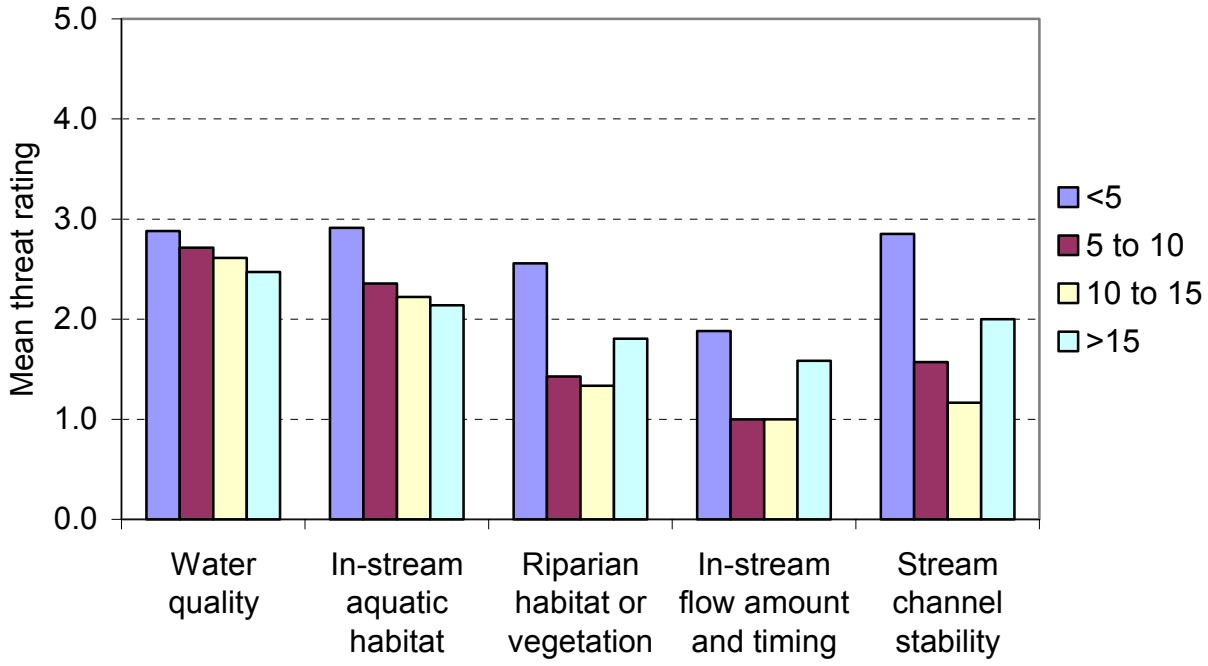


Figure 76. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(<5)**

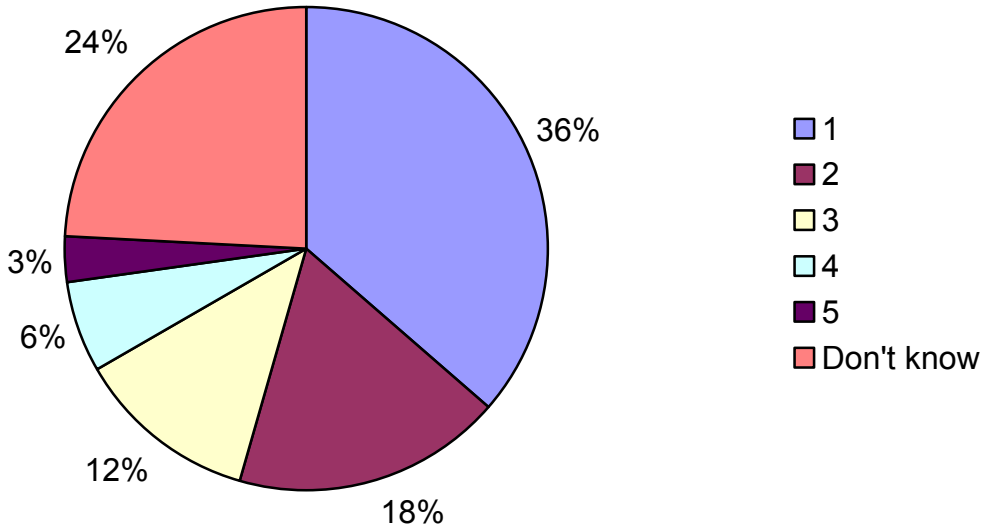


Figure 77. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(5 to 10)**

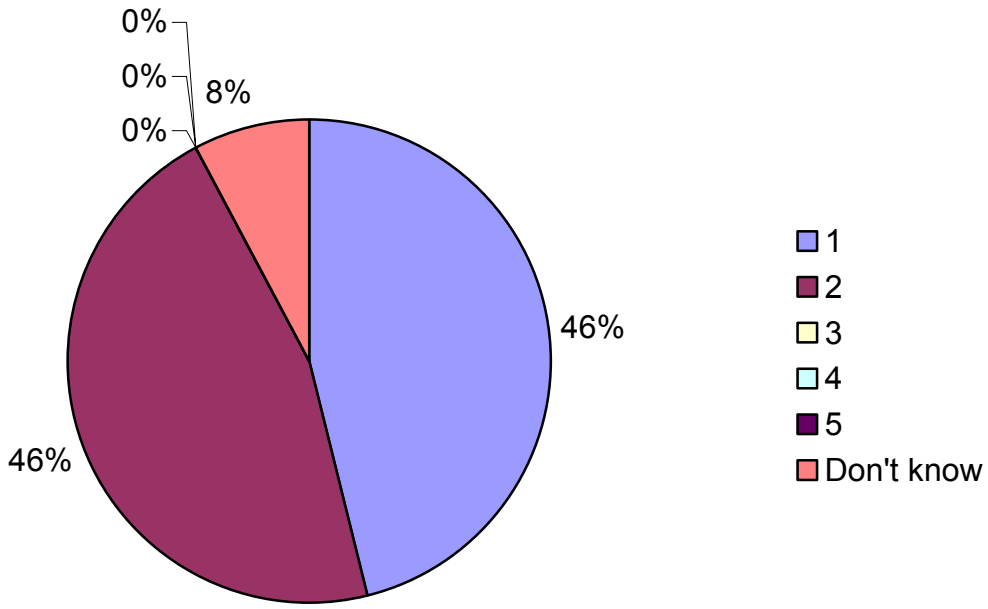


Figure 78. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000), 1=low, 5=extreme, **(10 to 15)**

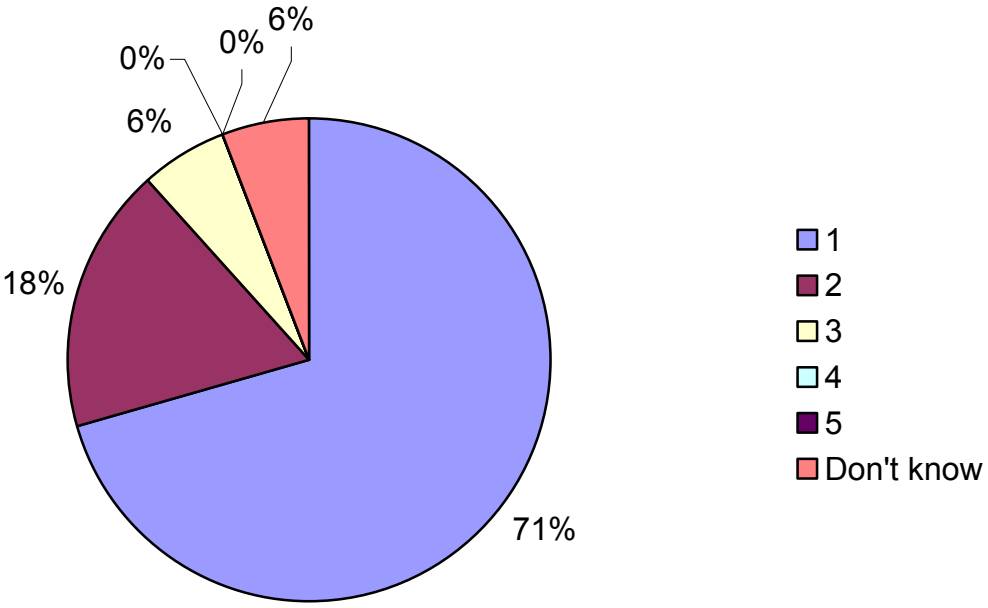


Figure 79. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme

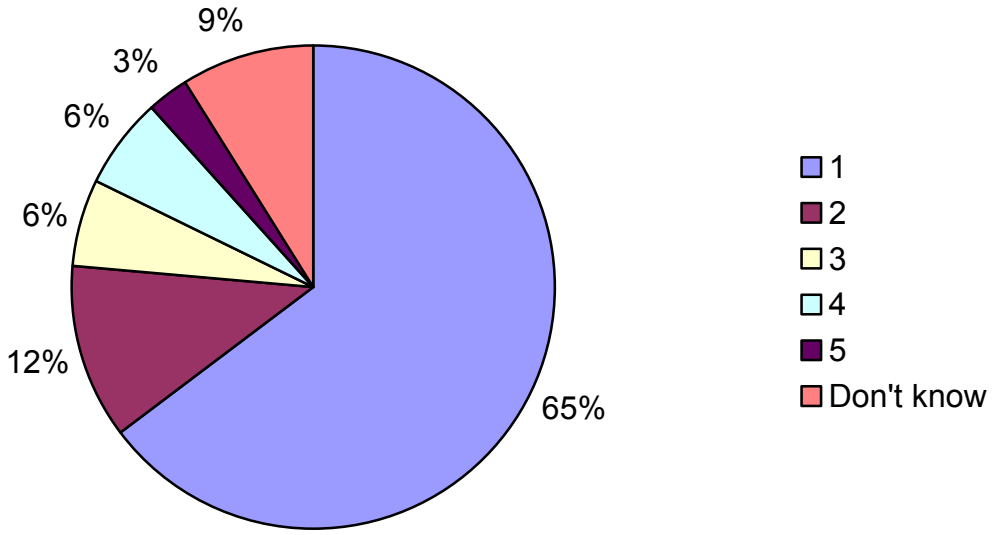
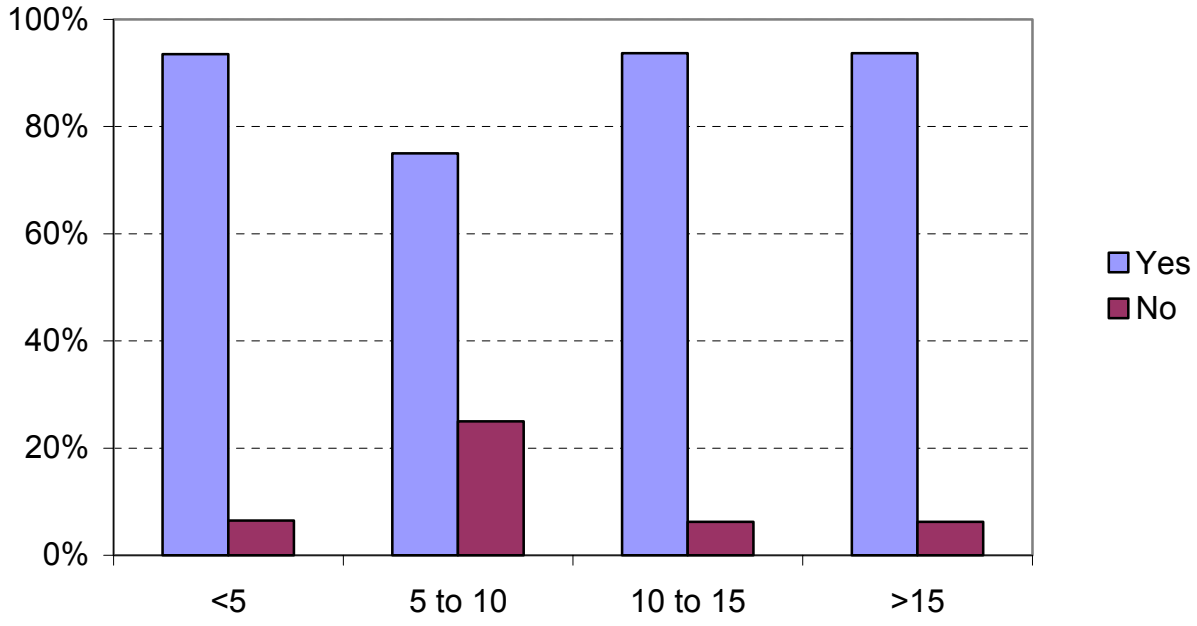


Figure 80. Can the management at this seasonal stream crossing be corrected sufficiently to protect water resource and keep the crossing in place?



SEASONAL STREAM CROSSING SITE EVALUATIONS BY PARTICIPANTS WHO DO AND DO NOT WORK DIRECTLY WITH LANDOWNERS.

Figures 81 - 85 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 19) based upon whether or not the participant works directly with landowners. Table 3 defines acronyms utilized in the figures.

There is essentially little difference in opinion between participants who work directly with landowners and those who do not.

Figure 81. Is this seasonal stream crossing a threat to water resources?

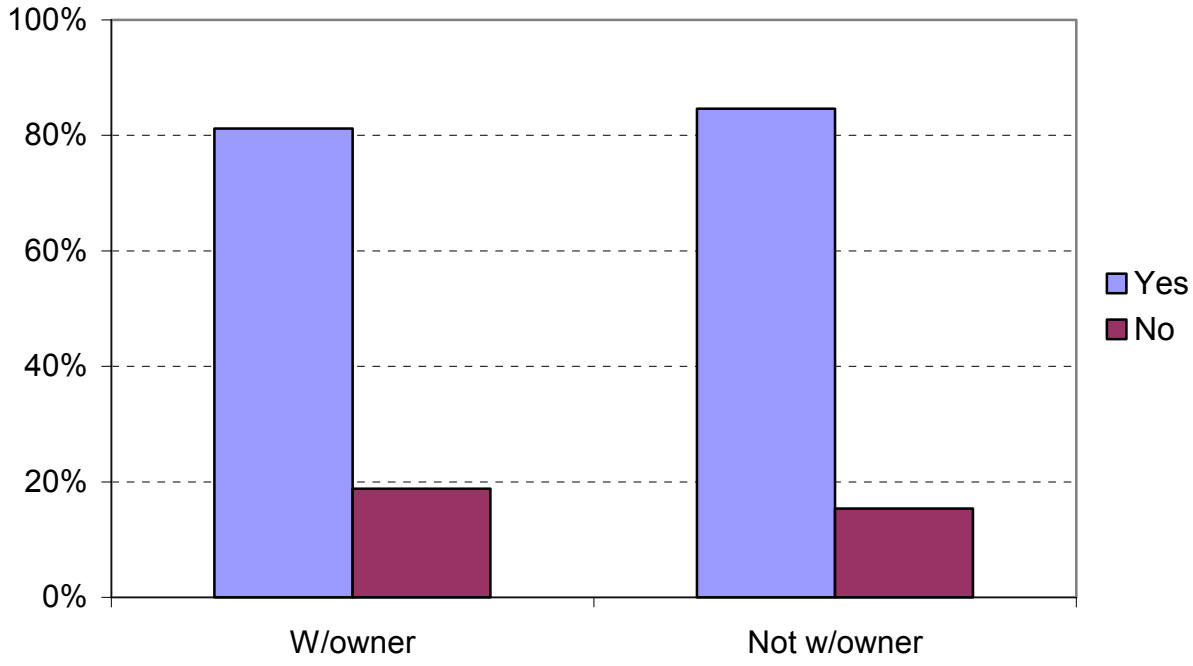


Figure 82. Mean threat rating (0=none, 5=extreme) of this seasonal stream crossing to each water resource attribute.

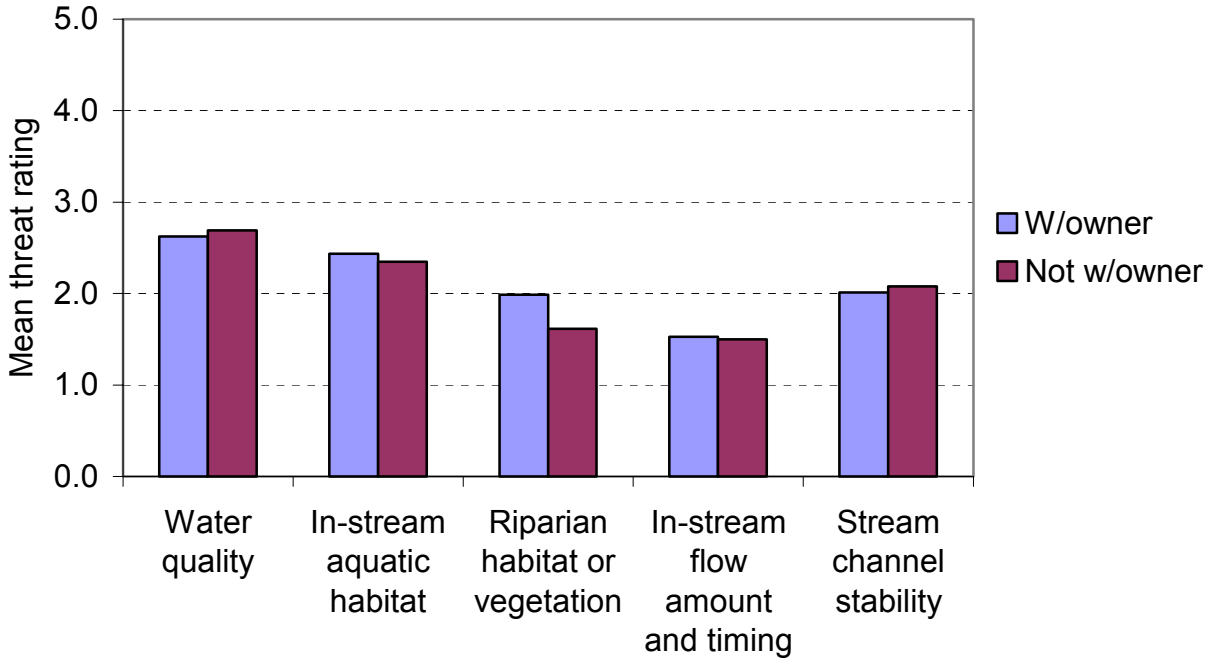


Figure 83. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(with owner)**

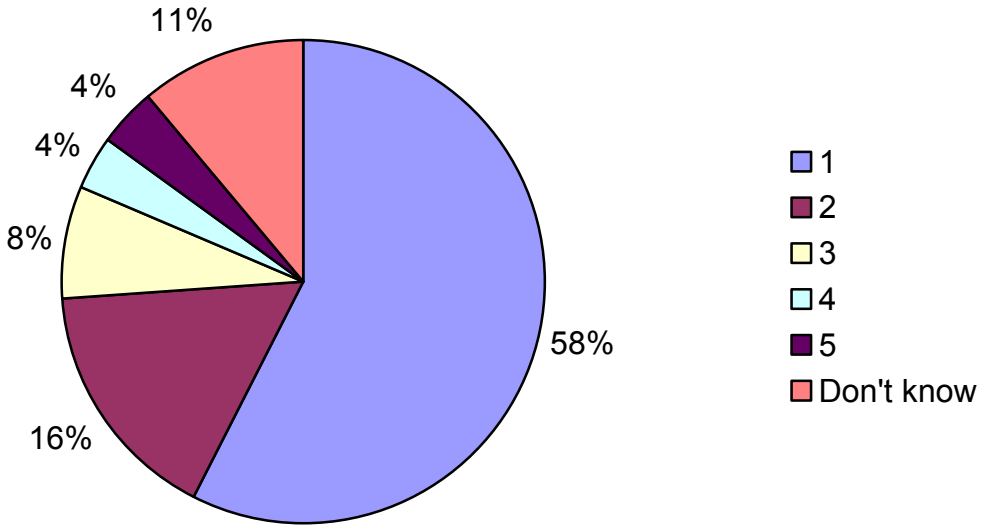


Figure 84. Rate this seasonal stream crossing's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(not with owner)**

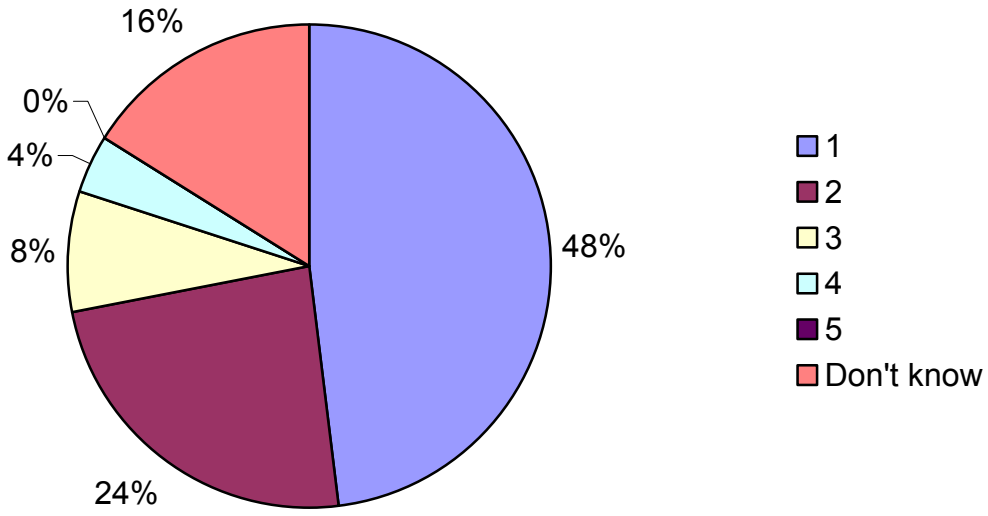
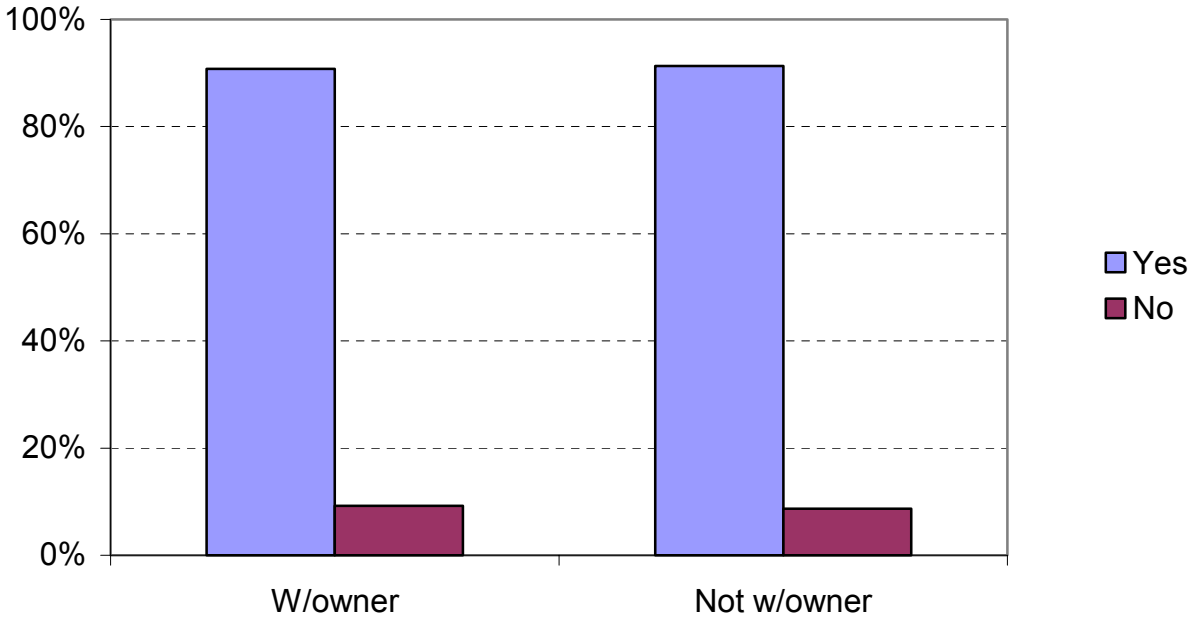


Figure 85. Can the management at this seasonal stream crossing be corrected sufficiently to protect water resource and keep the crossing in place?



ROAD CULVERT AND DRAINAGE SITE EVALUATIONS BY PARTICIPANT CURRENT EMPLOYER.

Table 4. Demographics utilized for analysis of relationships between participant professional demographics and participant site evaluations for road culverts and drainage.

DEMOGRAPHIC	LEVEL	SAMPLE SIZE
Employer	Resources Conservation District **(RCD)**	16
	Natural Resources Conservation Service **(NRCS)**	29
	University	15
	Self Employed **(Self)**	13
	Regional Water Quality Control Board **(RWQCB)**	20
Educational Background	Natural Resources Utilization **(NRuse)**; includes Agriculture, Agricultural Engineering, Forestry, Range Science, Animal Science, Watershed Management, Aquaculture	30
	Physical Sciences **(PhysiSci)**; includes Engineering, Hydrology, Soil Science, Geology, Geography, Biochemistry	34
	Natural Resources Protection **(NRpro)**; includes Environmental/Natural Resources-Biology, Environmental Science, Natural Resources, Wildlife & Fisheries, Ecology, Plant Science, Wildlife Management, Zoology	39
Total years experience as Natural Resource Professional	Less than 5 years **(<5 yr)**	34
	5 to 10 years **(5 to 10 yr)**	19
	10 to 15 years **(10 to 15 yr)**	13
	More than 15 years **(>15 yr)**	39
Work directly with Rangeland owners	Yes **(W/owner)**	93
	No **(Not w/owner)**	25

Figures 86 - 93 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 24) based upon participant current employer. Table 4 defines acronyms utilized in the figures.

There was relatively good agreement across agencies about the scope and scale of road culvert threat to water resources. Although RWQCB staff were less concerned about the threat of individual culverts at the sub-basin scale.

Figure 86. Is this road culvert and drainage a threat to water resources?

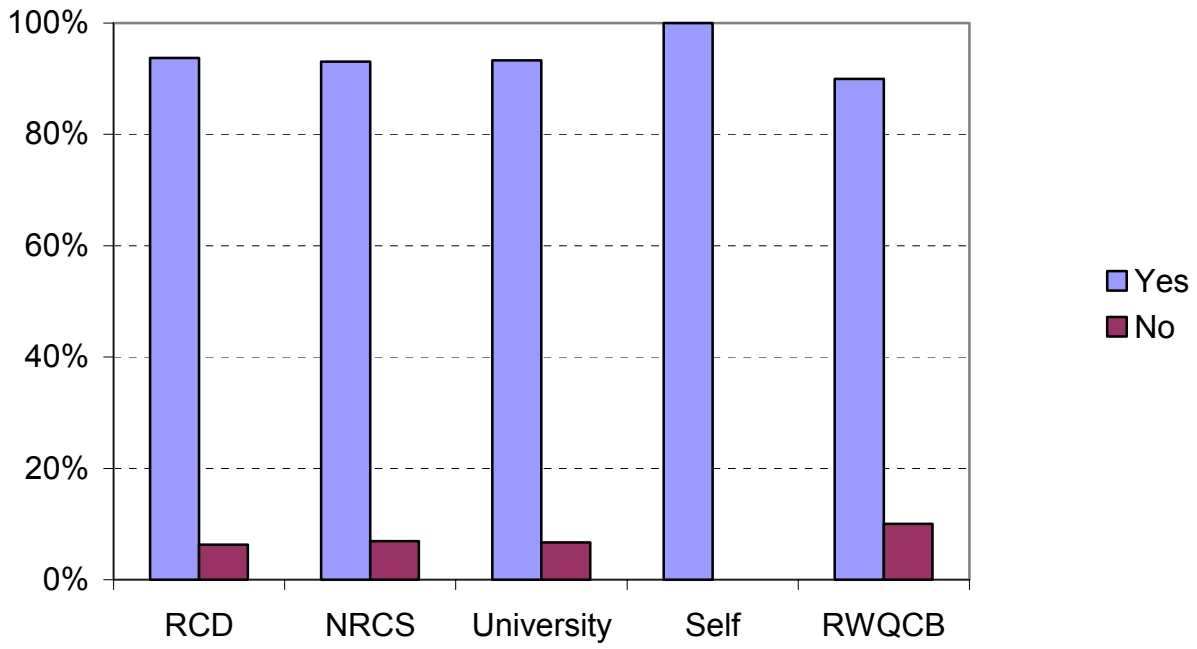


Figure 87. Mean threat rating (0=none, 5=extreme) of this road cuvert and drainage to each water resource attribute.

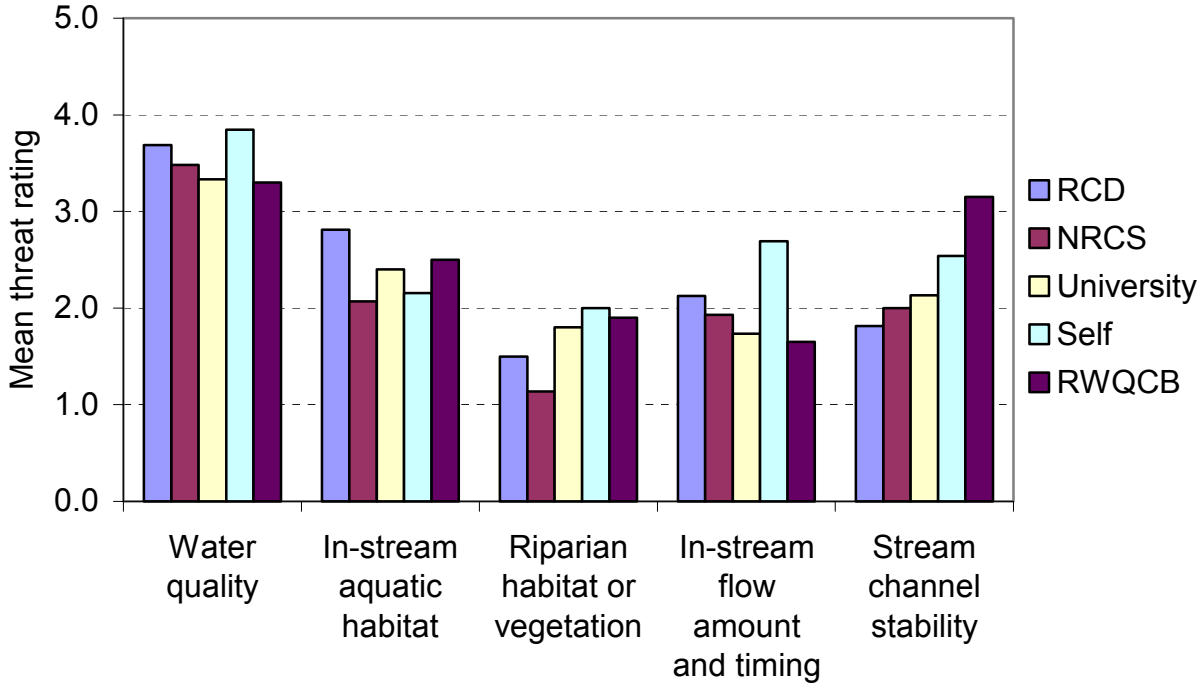


Figure 88. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RCD)**

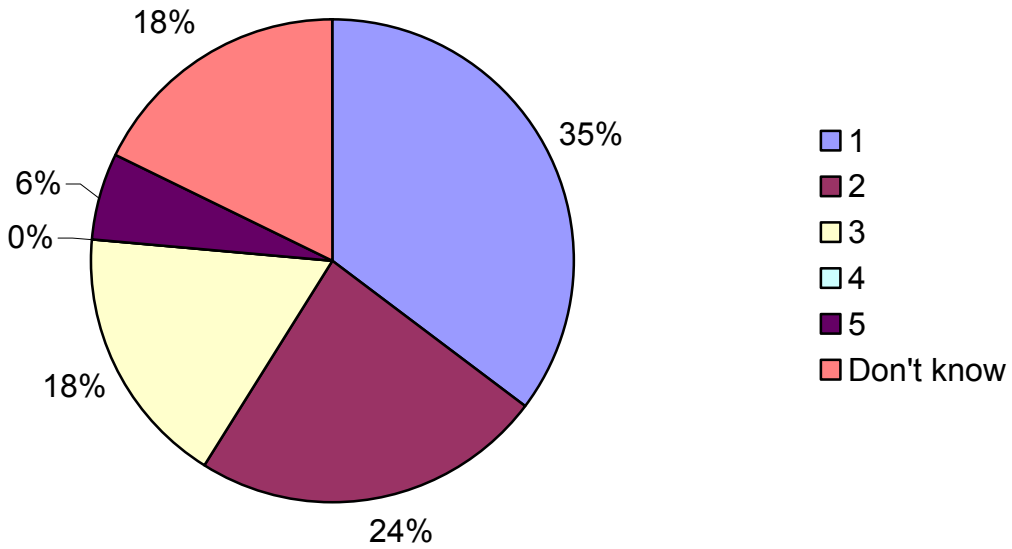


Figure 89. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRCS)**

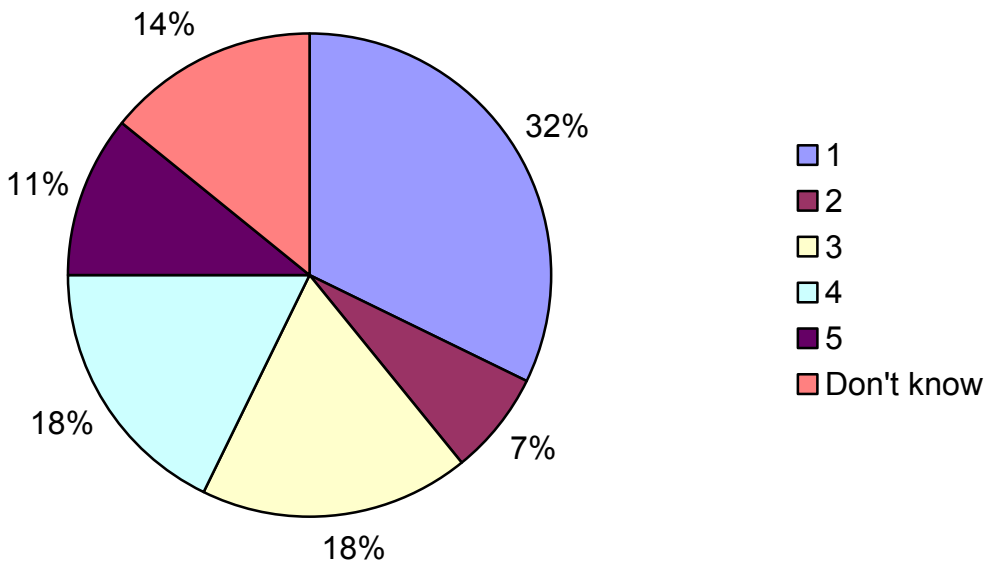


Figure 90. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(University)**

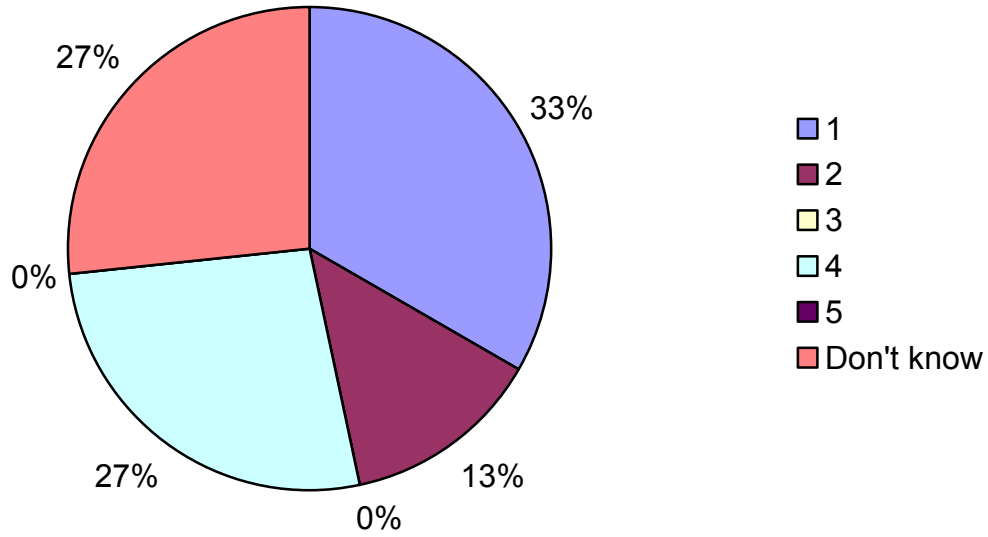


Figure 91. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(Self)**

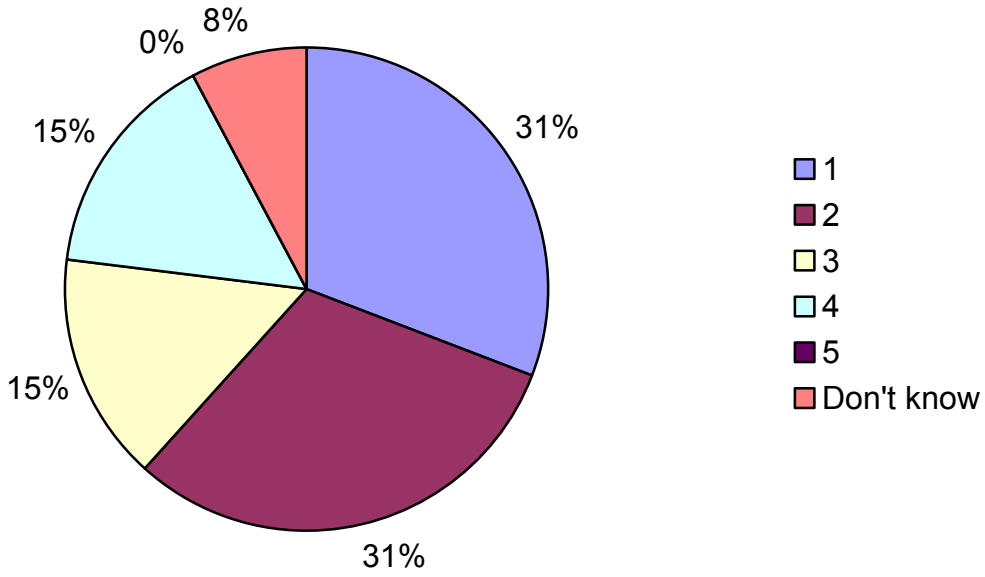


Figure 92. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RWQCB)**

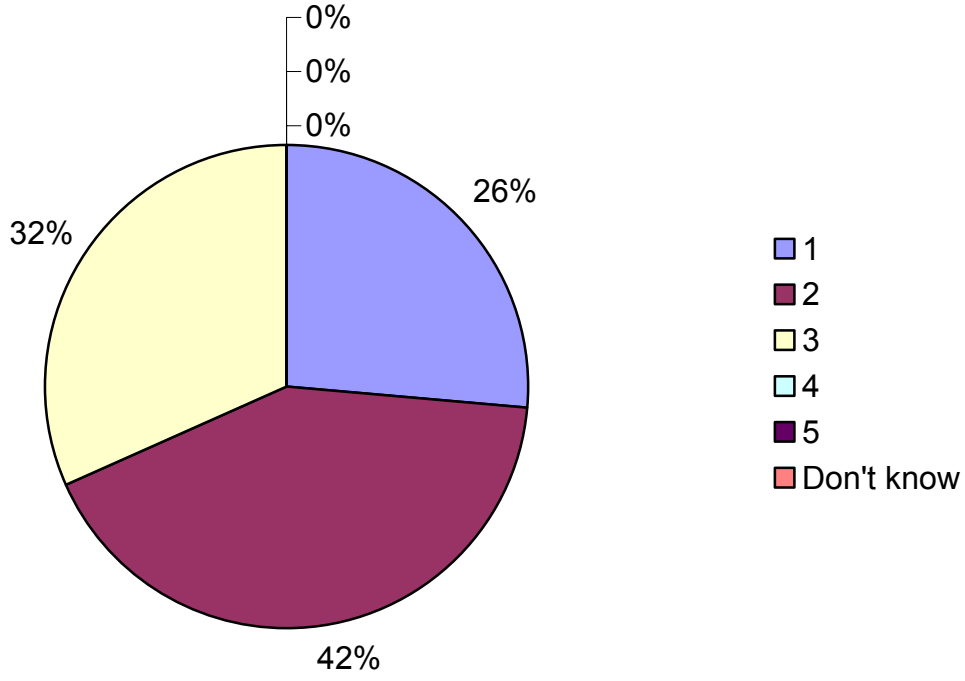
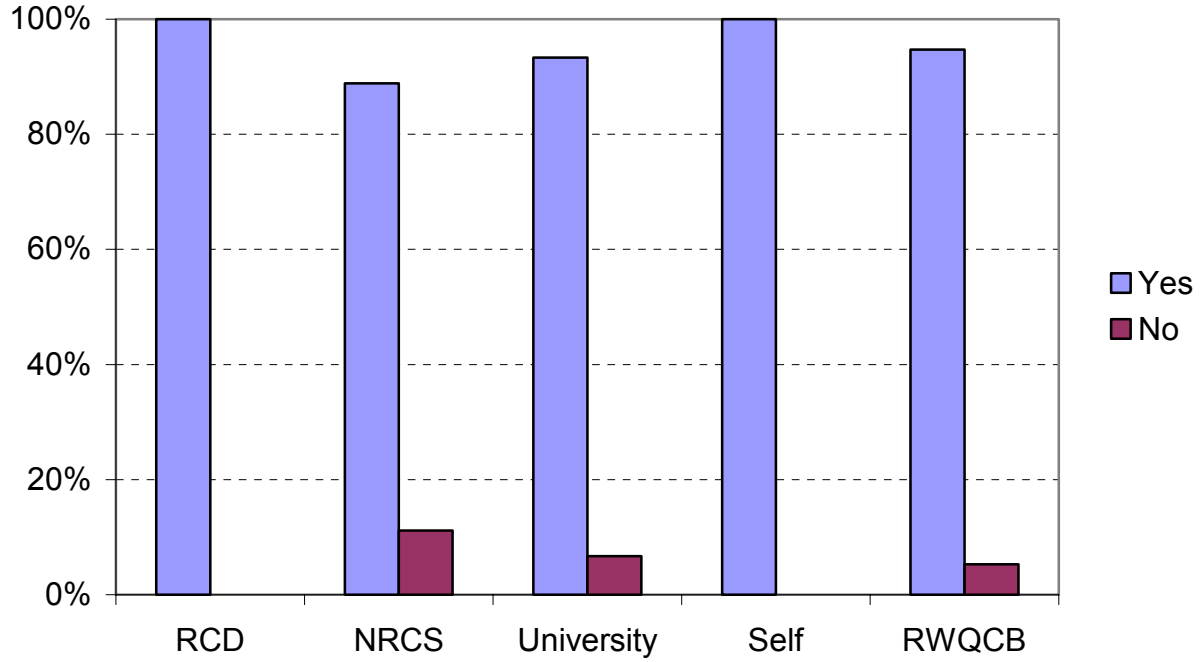


Figure 93. Can the management at this road culvert and drainage be corrected sufficiently to protect water resource and keep the culvert in place?



ROAD CULVERT AND DRAINAGE SITE EVALUATIONS BY PARTICIPANT EDUCATION.
Figures 94 - 99 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 24) based upon participant education. Table 3 defines acronyms utilized in the figures.

Participants with physical science education degrees were slightly less likely (17% no) to view the culverts as water quality threats. Otherwise, agreement was strong.

Figure 94. Is this road culvert and drainage a threat to water resources?

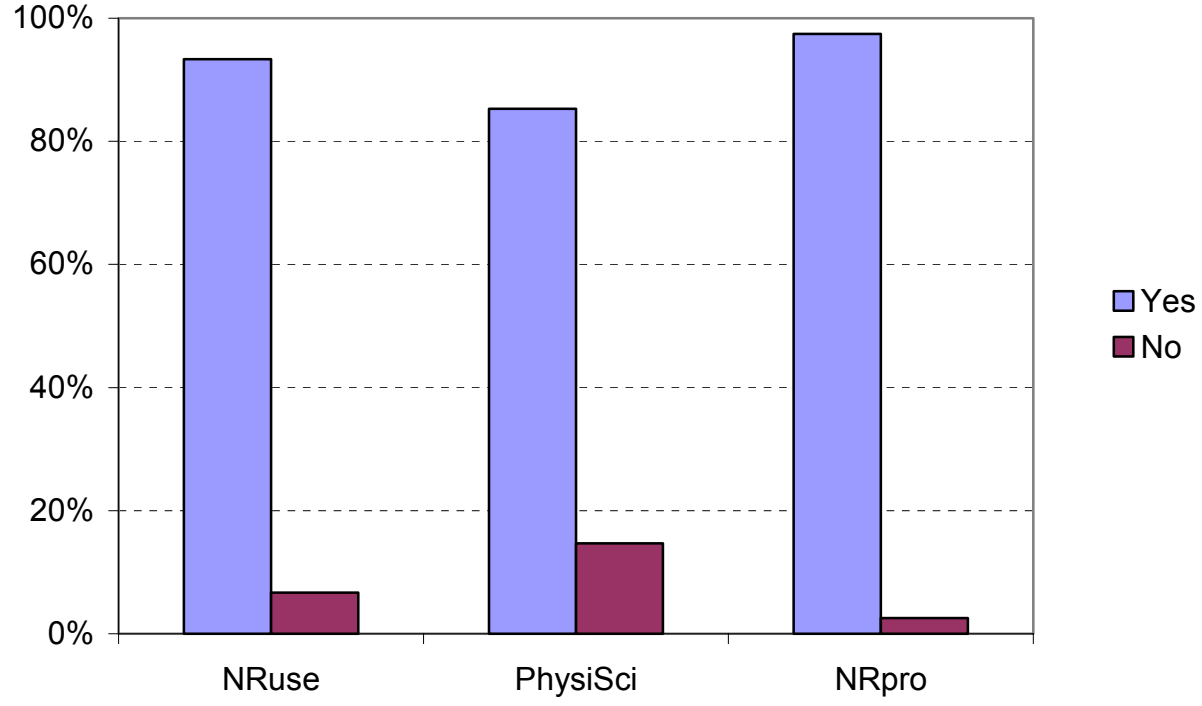


Figure 95. Mean threat rating (0=none, 5=extreme) of this road culvert and drainage to each water resource attribute.

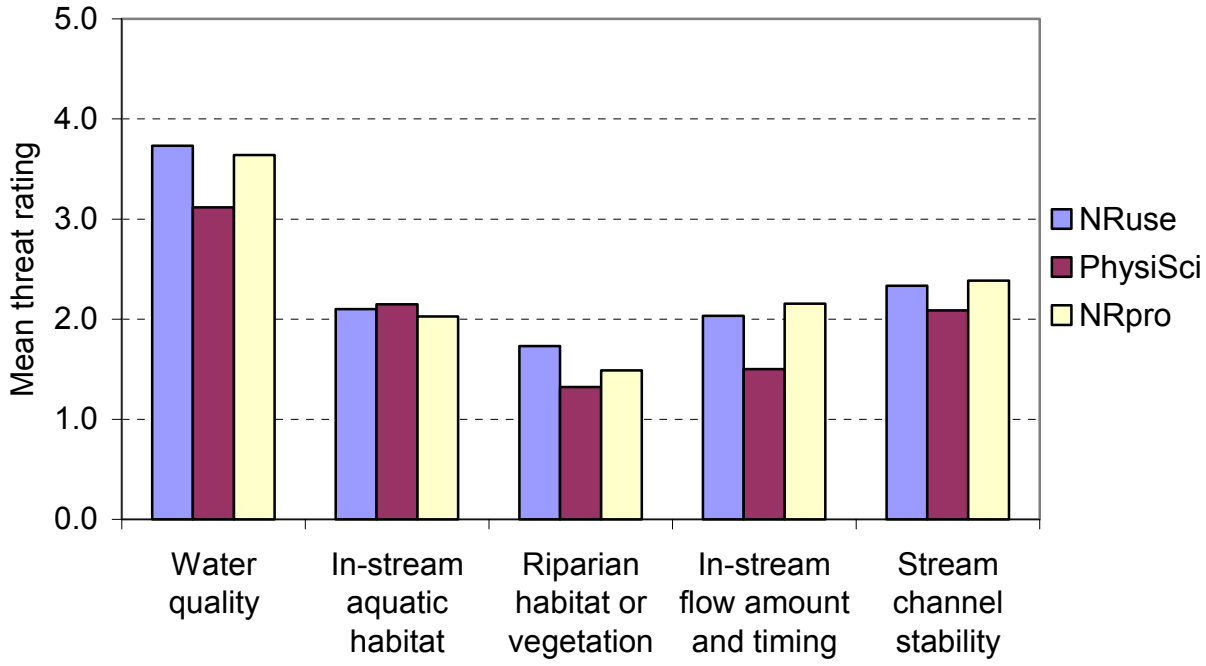


Figure 96. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRuse)**

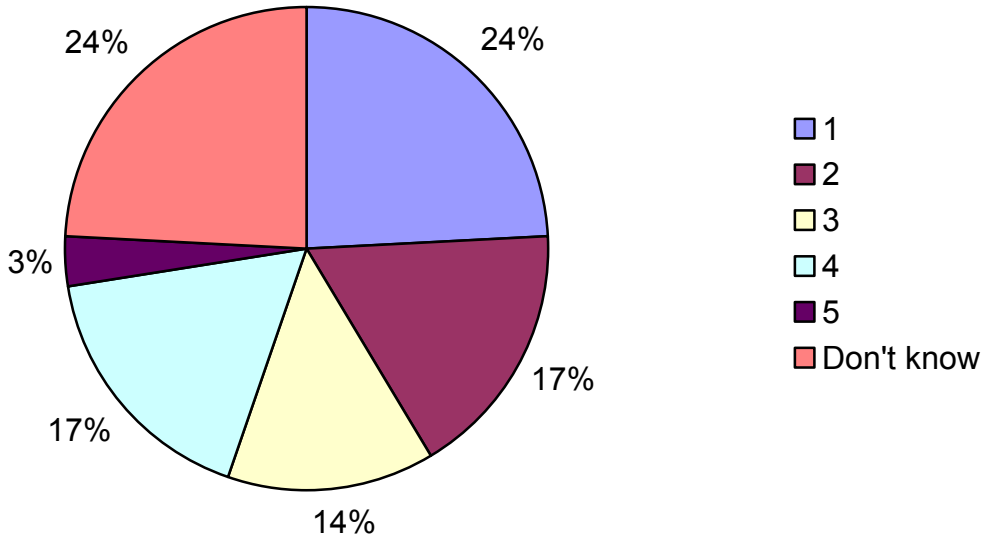


Figure 97. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(PhysiSci)**

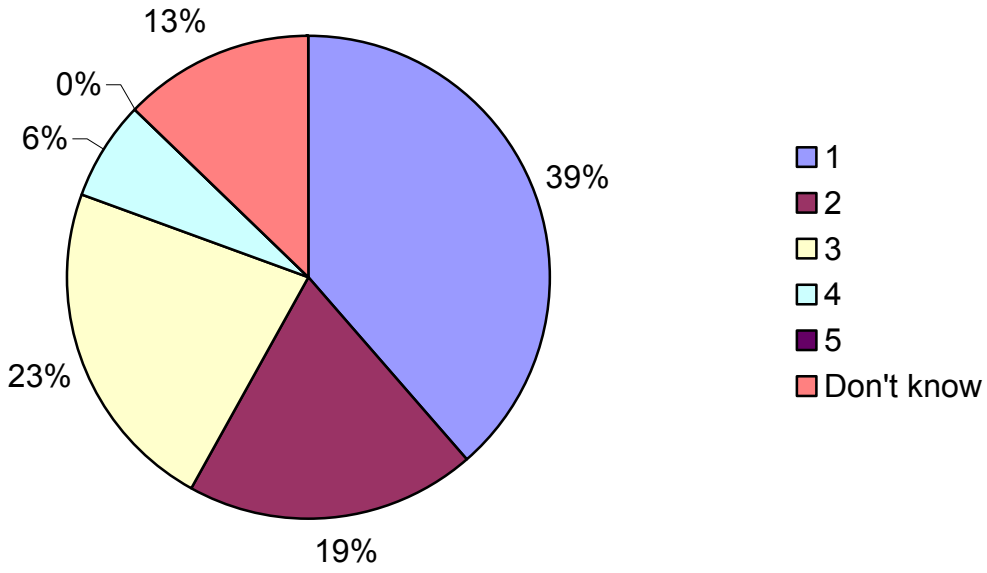


Figure 98. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRpro)**

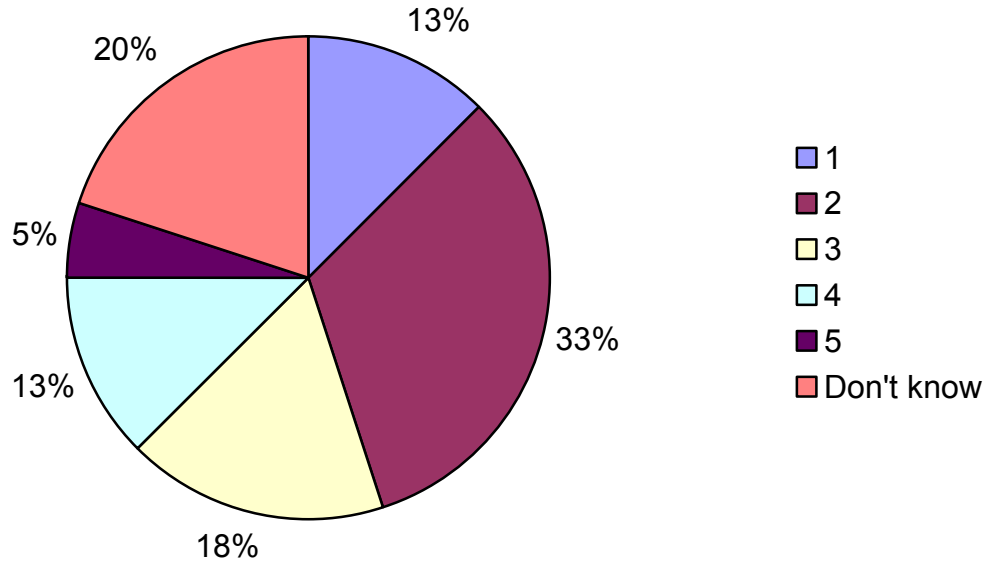
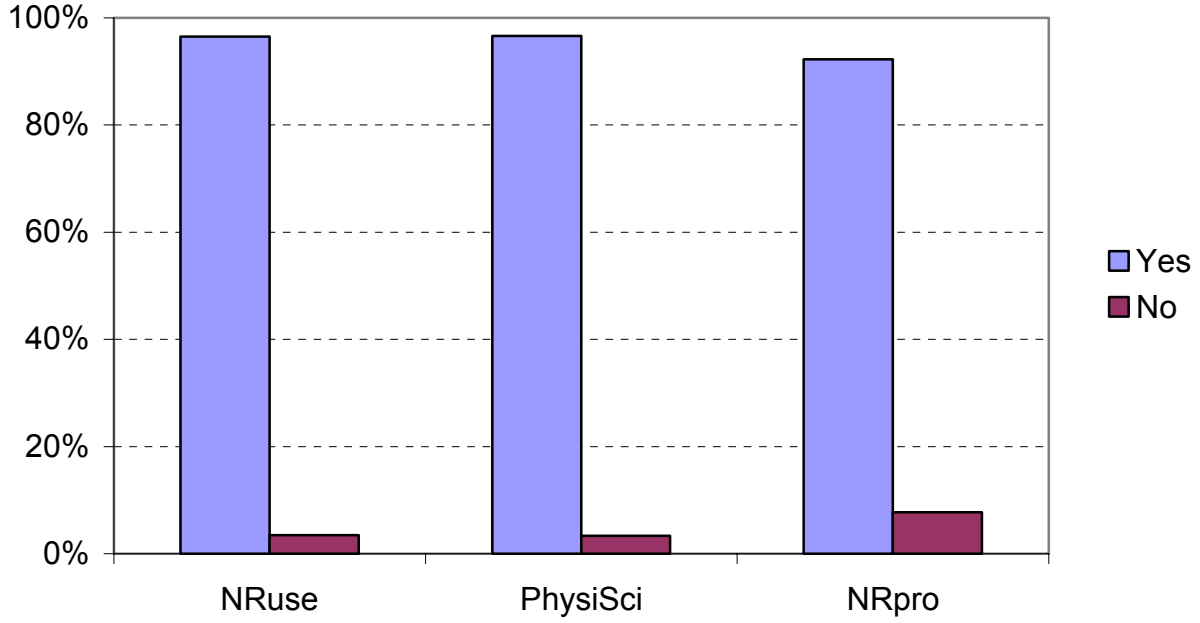


Figure 99. Can the management at this road culvert and drainage be corrected sufficiently to protect water resource and keep the culvert in place?



ROAD CULVERT AND DRAINAGE SITE EVALUATIONS BY PARTICIPANT EXPERIENCE.
Figures 100 - 106 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 24) based upon participant experience. Table 3 defines acronyms utilized in the figures.

This analysis revealed few trends in opinion about the culverts due to experience.

Figure 100. Is this road culvert and drainage a threat to water resources?

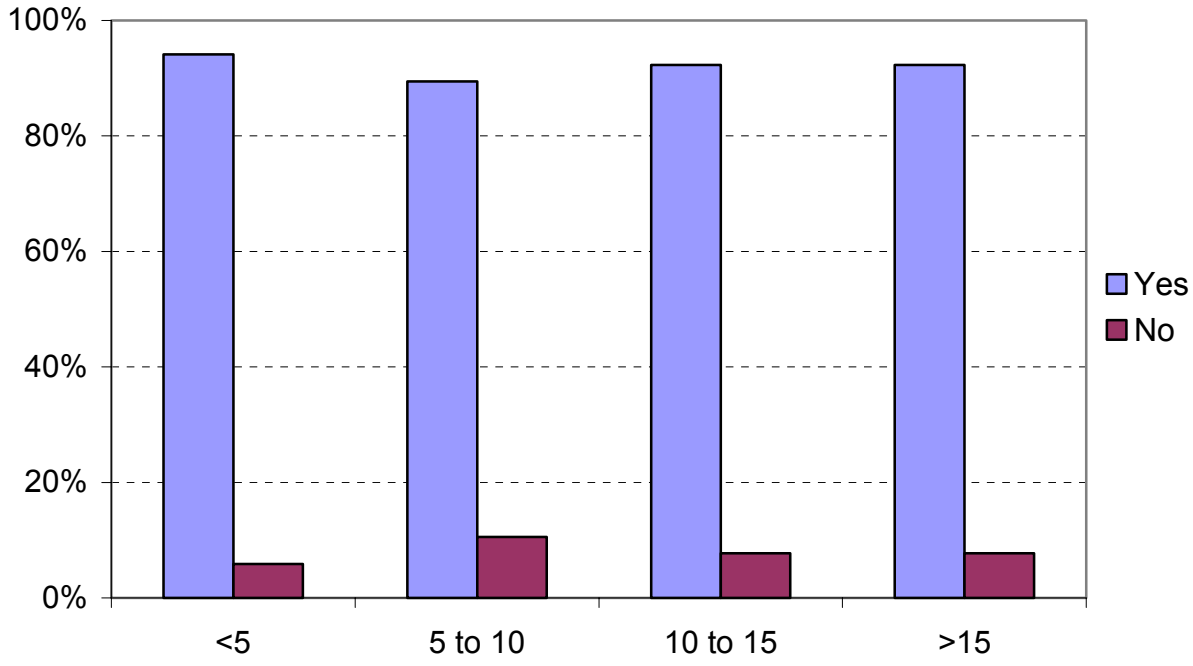


Figure 101. Mean threat rating (0=none, 5=extreme) of this road culvert and drainage to each water resource attribute.

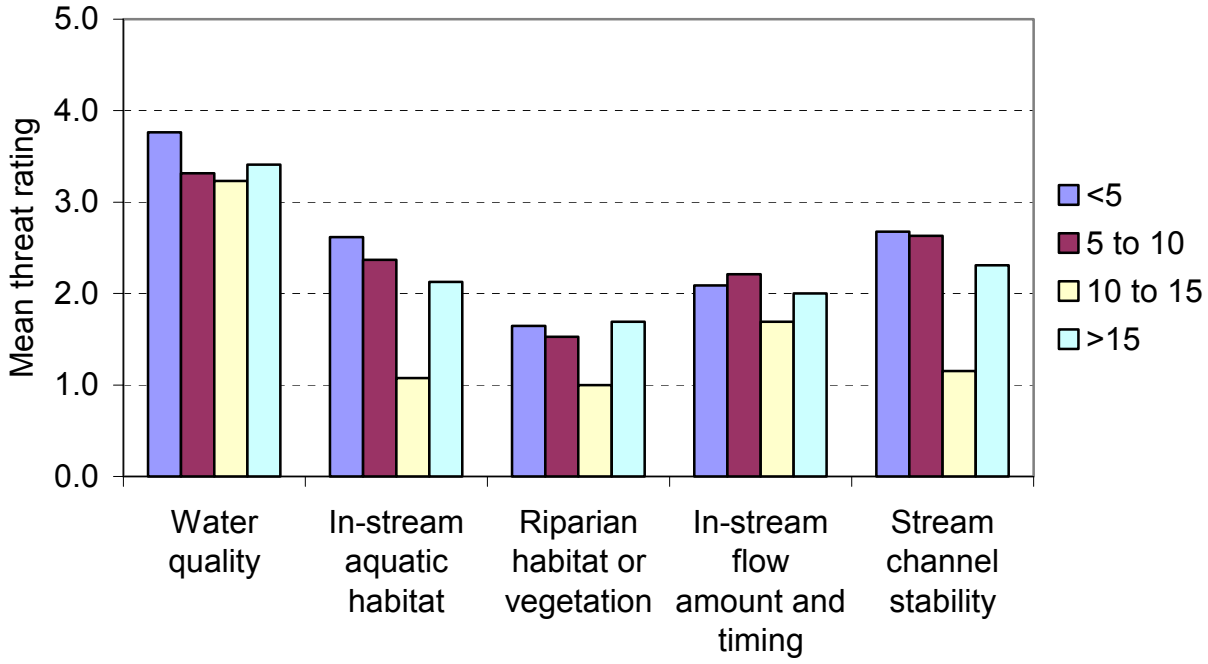


Figure 102. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(<5)**

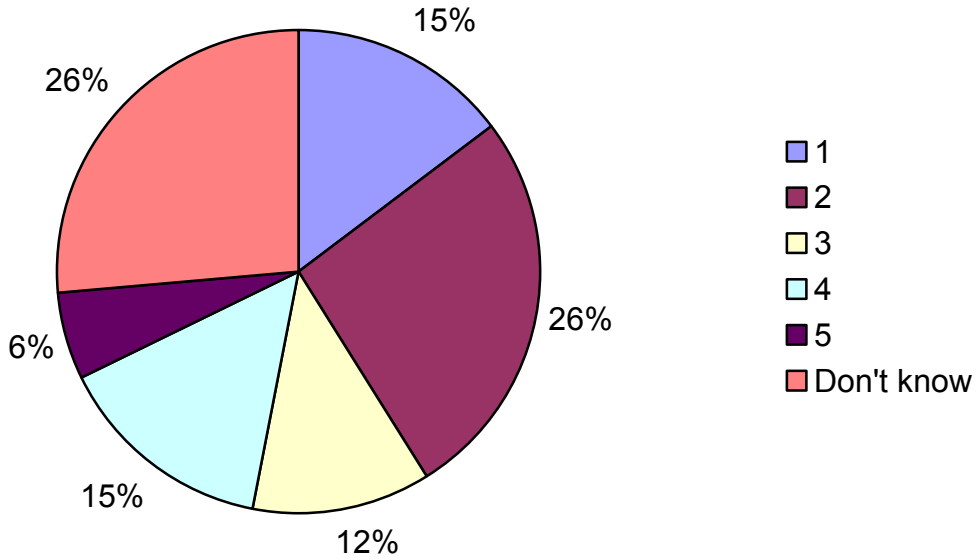


Figure 103. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(5 to 10)**

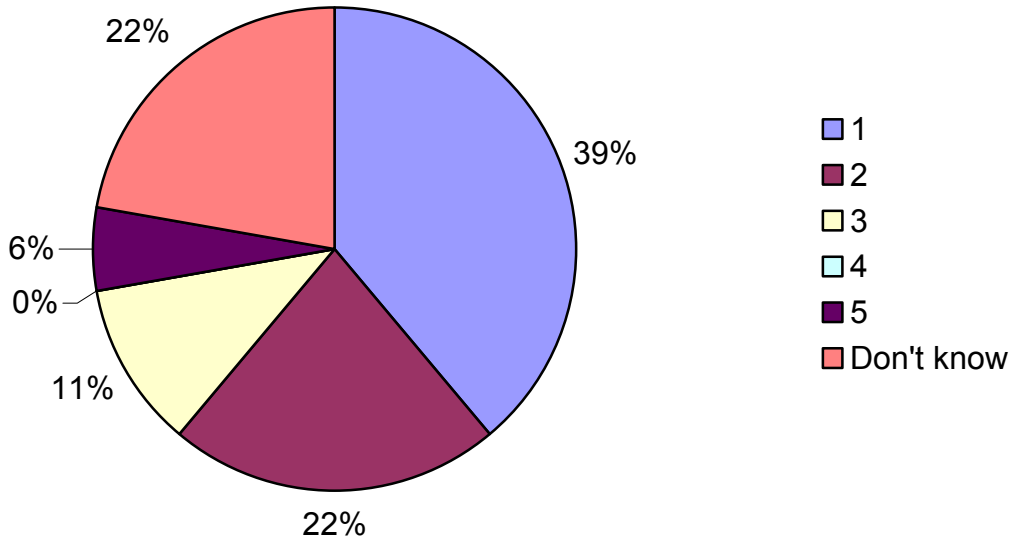


Figure 104. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(10 to 15)**

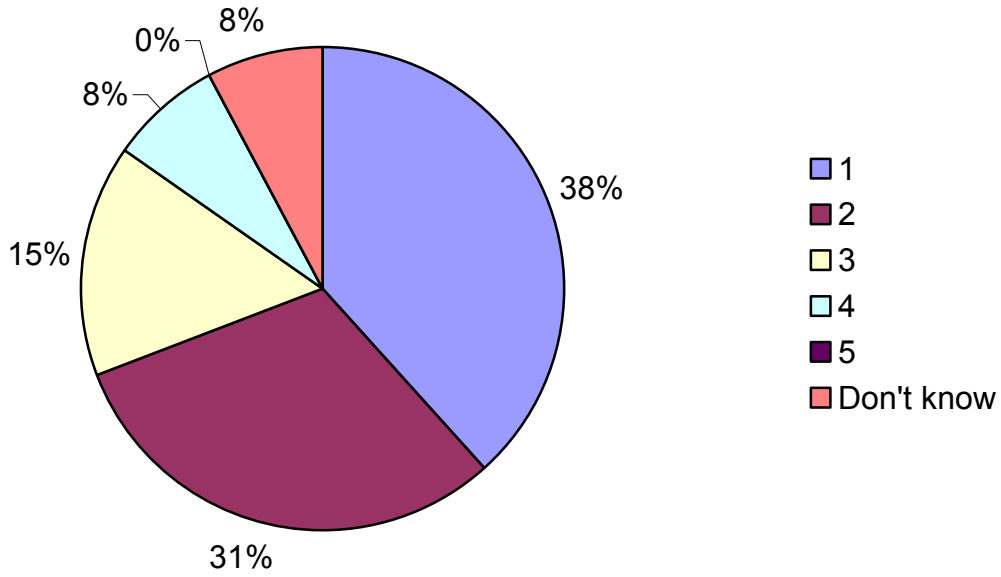


Figure 105. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(15<)**

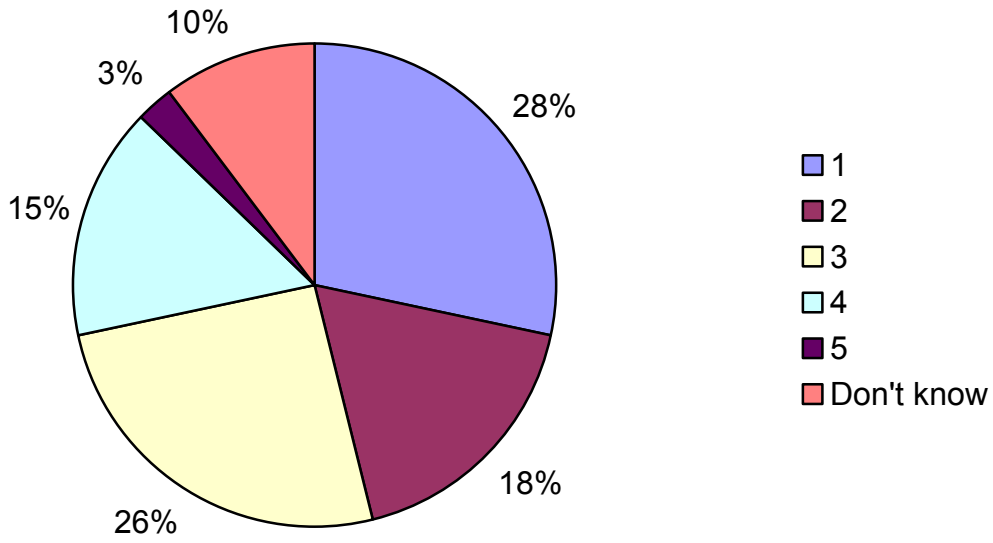
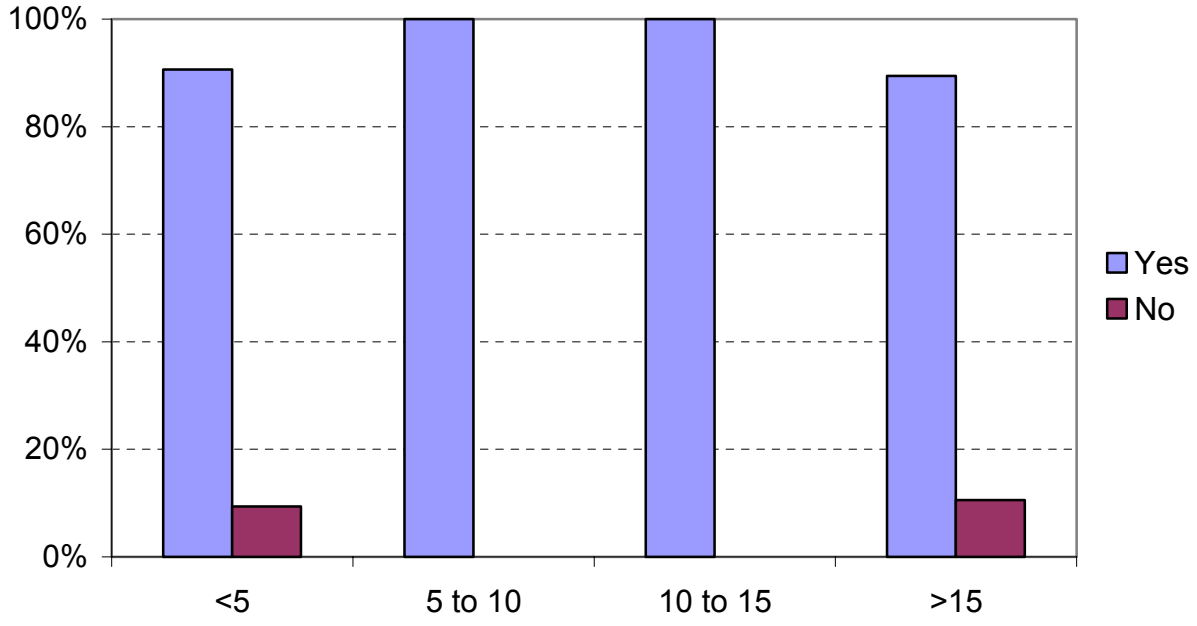


Figure 106. Can the management at this road culvert and drainage be corrected sufficiently to protect water resource and keep the culvert in place?



ROAD CULVERT AND DRAINAGE SITE EVALUATIONS BY PARTICIPANTS WHO DO AND DO NOT WORK DIRECTLY WITH LANDOWNERS.

Figures 107 - 111 represent the breakdown of site evaluations of the seasonal stream crossing sites (Figure 24) based upon whether or not the participant works directly with landowners. Table 3 defines acronyms utilized in the figures.

There is essentially little difference in opinion between participants who work directly with landowners and those who do not.

Figure 107. Is this road culvert and drainage a threat to water resources?

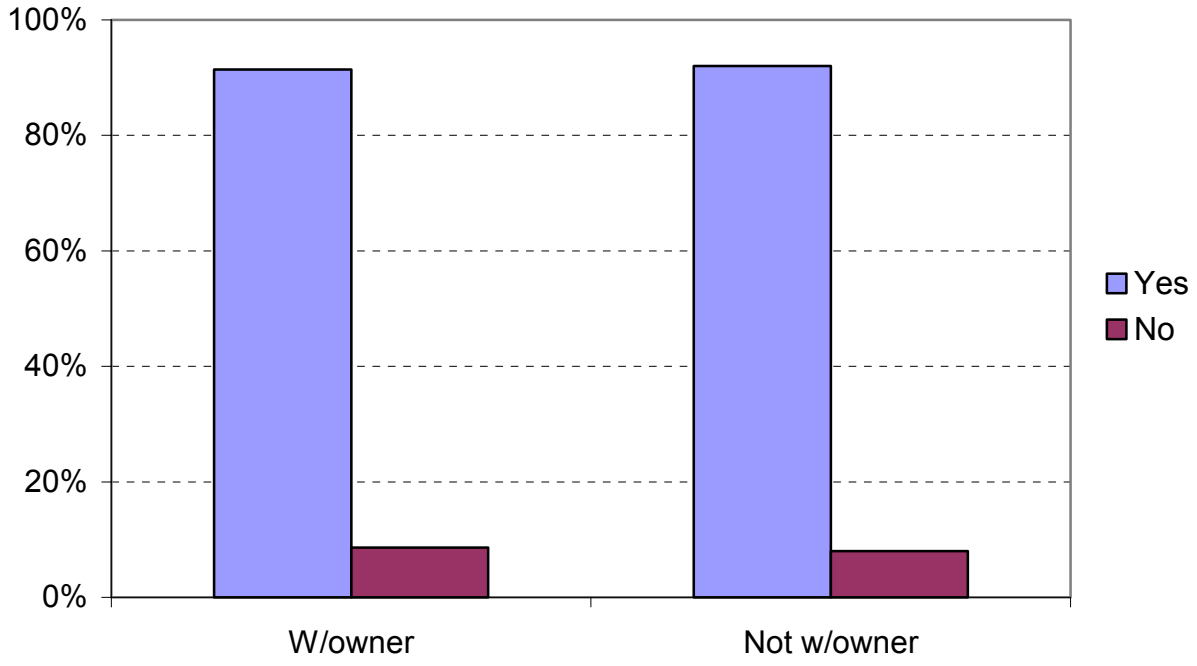


Figure 108. Mean threat rating (0=none, 5=extreme) of this road culvert and drainage to each water resource attribute.

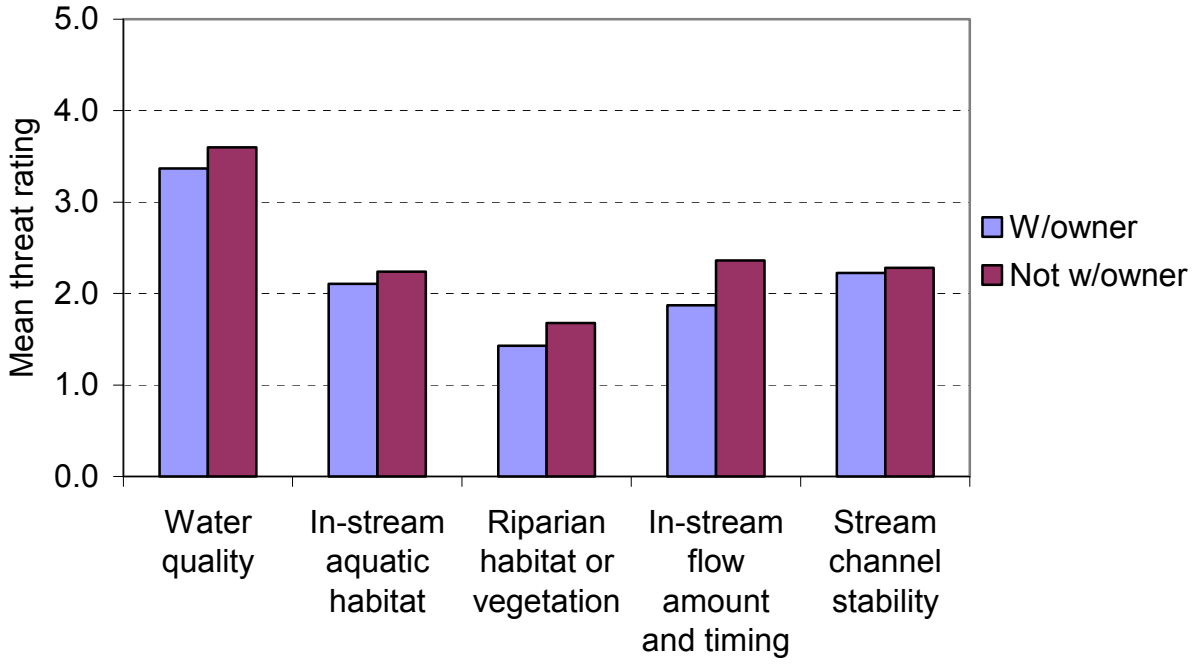


Figure 109. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(with owner)**

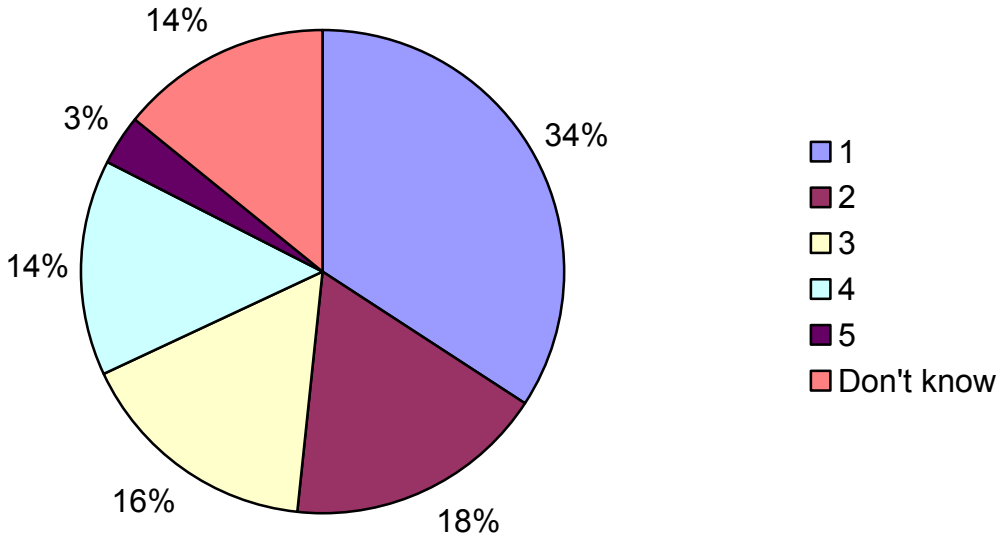


Figure 110. Rate this road culvert and drainage's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(not with owner)**

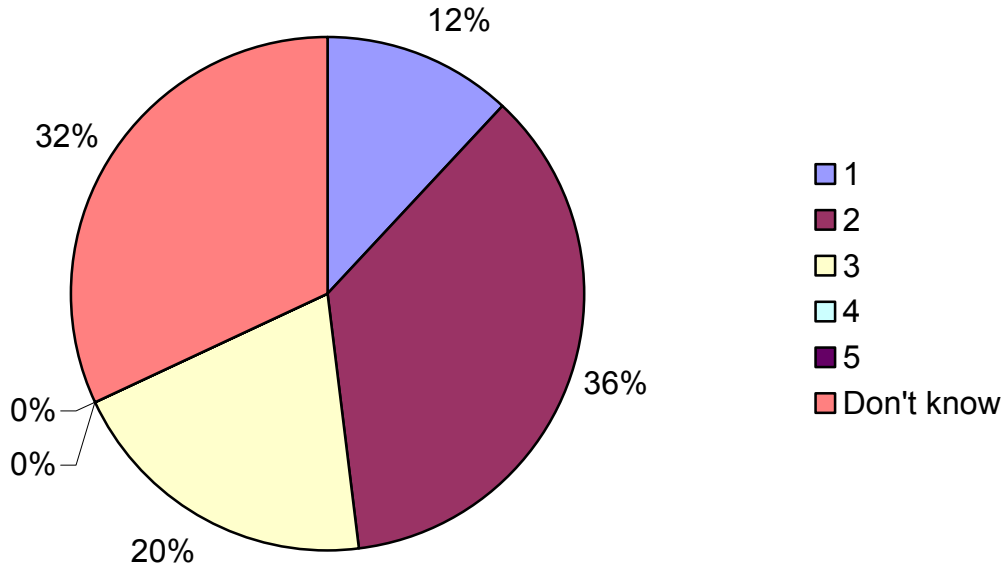
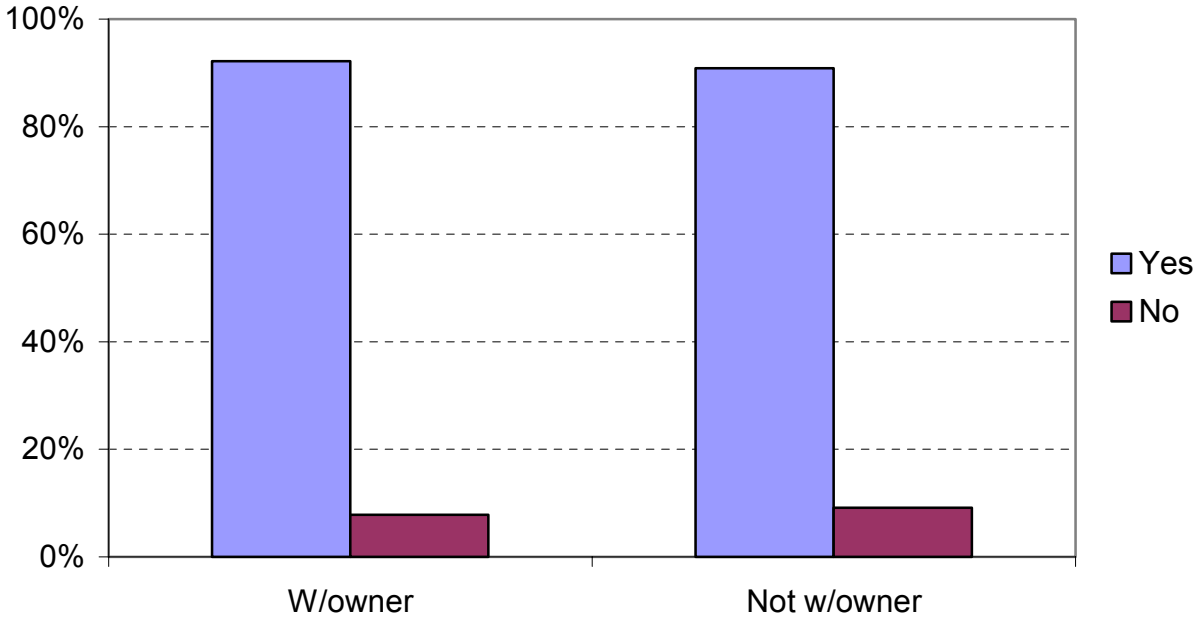


Figure 111. Can the management at this road culvert and drainage be corrected sufficiently to protect water resource and keep the culvert in place?



RIPARIAN GRAZING SITE EVALUATIONS BY PARTICIPANT CURRENT EMPLOYER.

Table 5. Demographics utilized for analysis of relationships between participant professional demographics and participant site evaluations for riparian grazing. Note that there were less than 6 RWQCB responses to this type of site.

DEMOGRAPHIC	LEVEL	SAMPLE SIZE
Employer	Resources Conservation District **(RCD)**	11
	Natural Resources Conservation Service **(NRCS)**	26
	University	6
	Self Employed **(Self)**	10
Educational Background	Natural Resources Utilization **(NRuse)**; includes Agriculture, Agricultural Engineering, Forestry, Range Science, Animal Science, Watershed Management, Aquaculture	20
	Physical Sciences **(PhysiSci)**; includes Engineering, Hydrology, Soil Science, Geology, Geography, Biochemistry	11
	Natural Resources Protection **(NRpro)**; includes Environmental/Natural Resources-Biology, Environmental Science, Natural Resources, Wildlife & Fisheries, Ecology, Plant Science, Wildlife Management, Zoology	35
Total years experience as Natural Resource Professional	Less than 5 years **(<5 yr)**	24
	5 to 10 years **(5 to 10 yr)**	7
	10 to 15 years **(10 to 15 yr)**	15
	More than 15 years **(>15 yr)**	24
Work directly with Rangeland owners	Yes **(W/owner)**	57
	No **(Not w/owner)**	21

Figures 112 - 118 represent the breakdown of site evaluations of the seasonal riparian grazing sites (Figure 29) based upon participant current employer. Table 5 defines acronyms utilized in the figures.

The most striking result from this analysis is that fewer University staff saw these riparian grazing sites as a threat to water resources (18% no), but they also felt there was less potential to mitigate this impact (18% no).

Figure 112. Is this riparian grazing a threat to water resources?

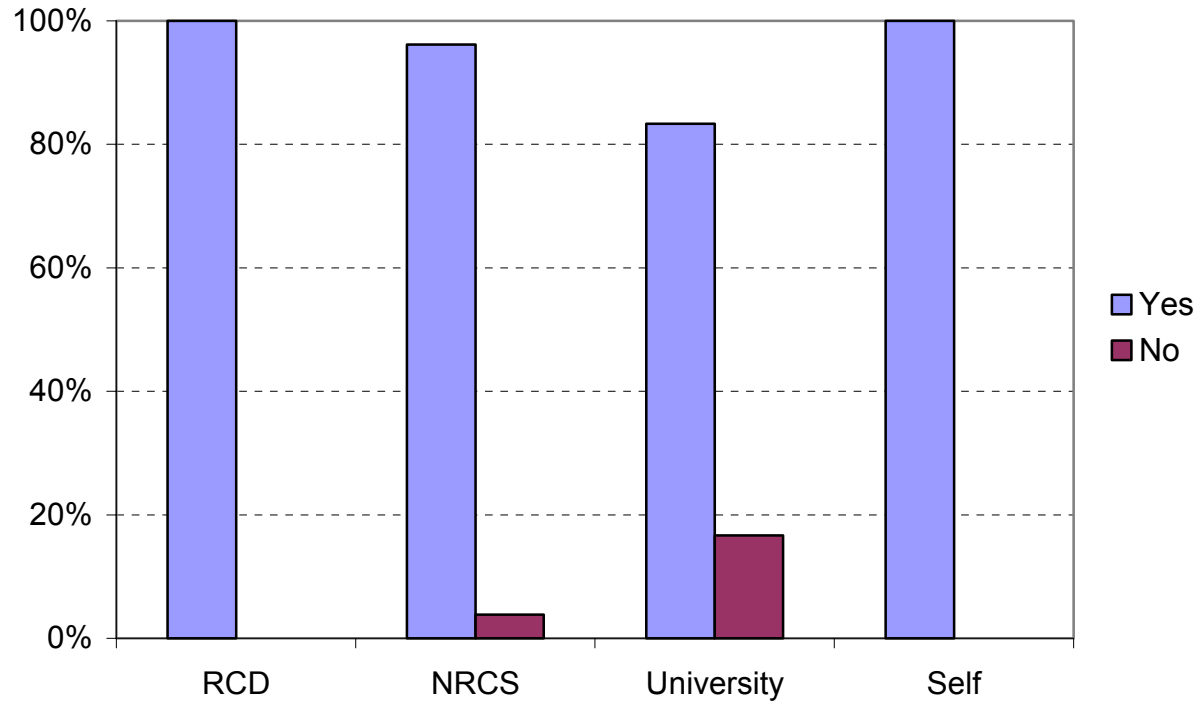


Figure 113. Mean threat rating (0=none, 5=extreme) of this riparian grazing to each water resource attribute.

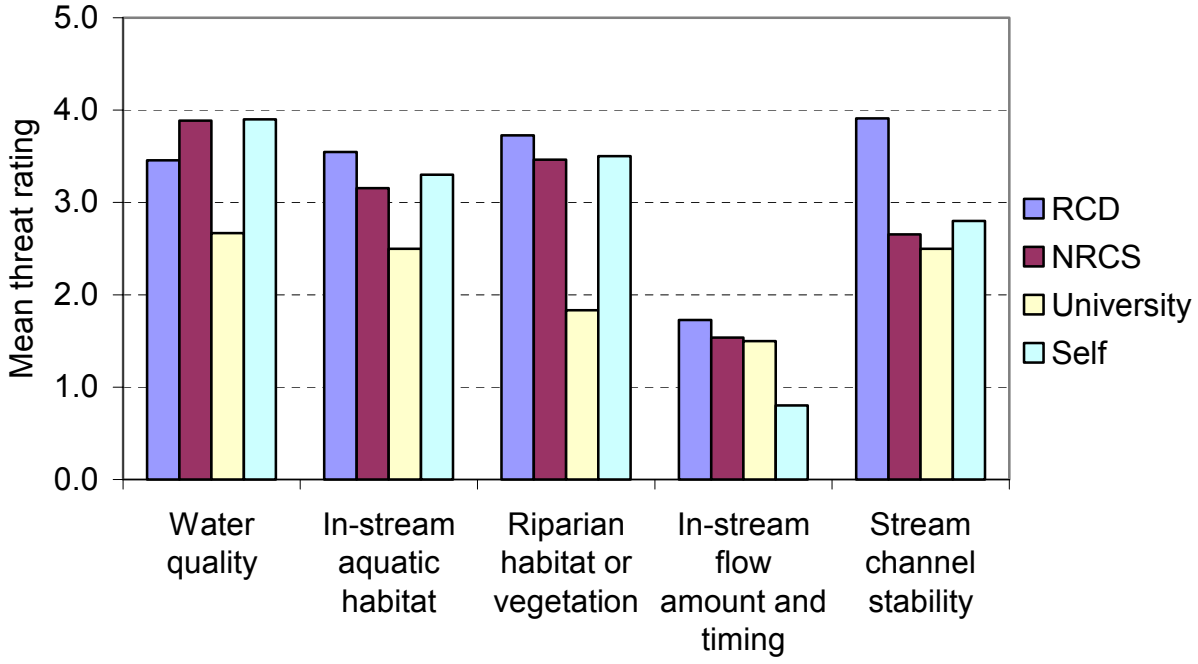


Figure 114. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(RCD)**

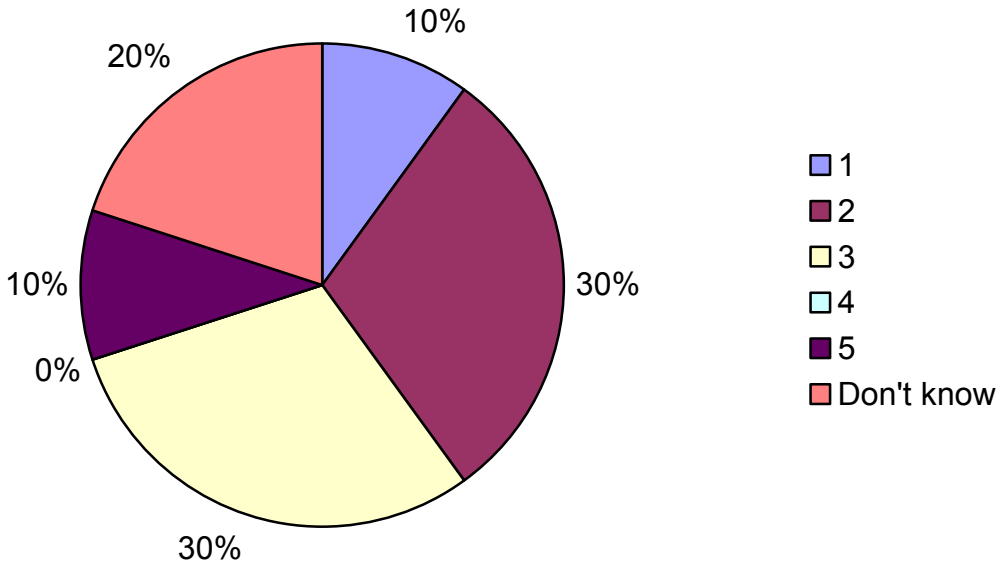


Figure 115. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRCS)**

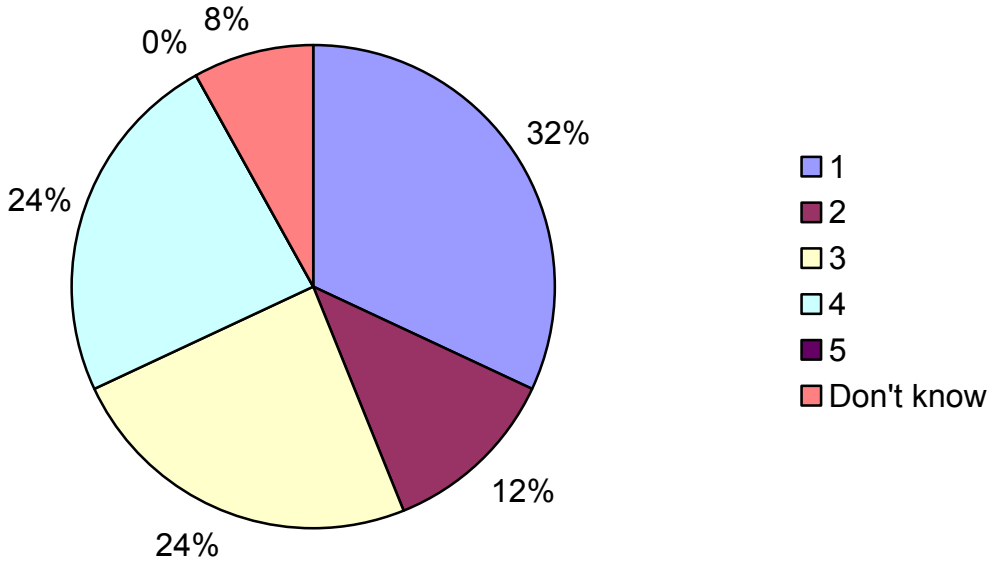


Figure 116. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(University)**

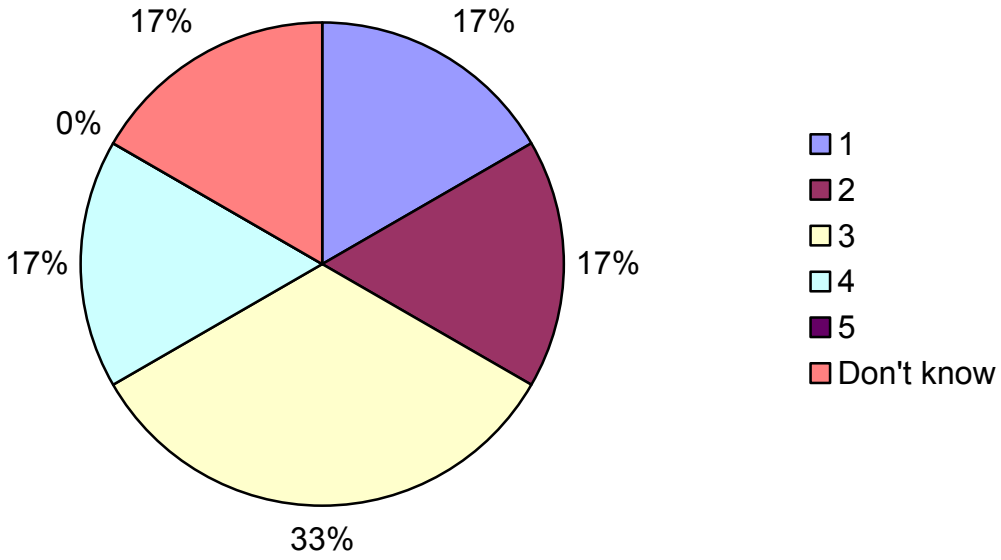


Figure 117. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(Self)**

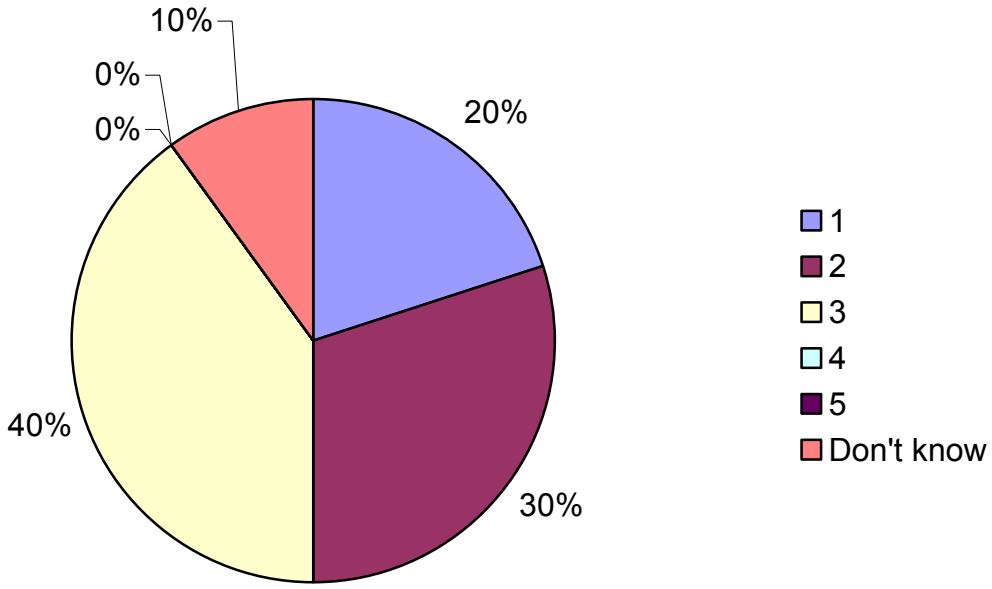
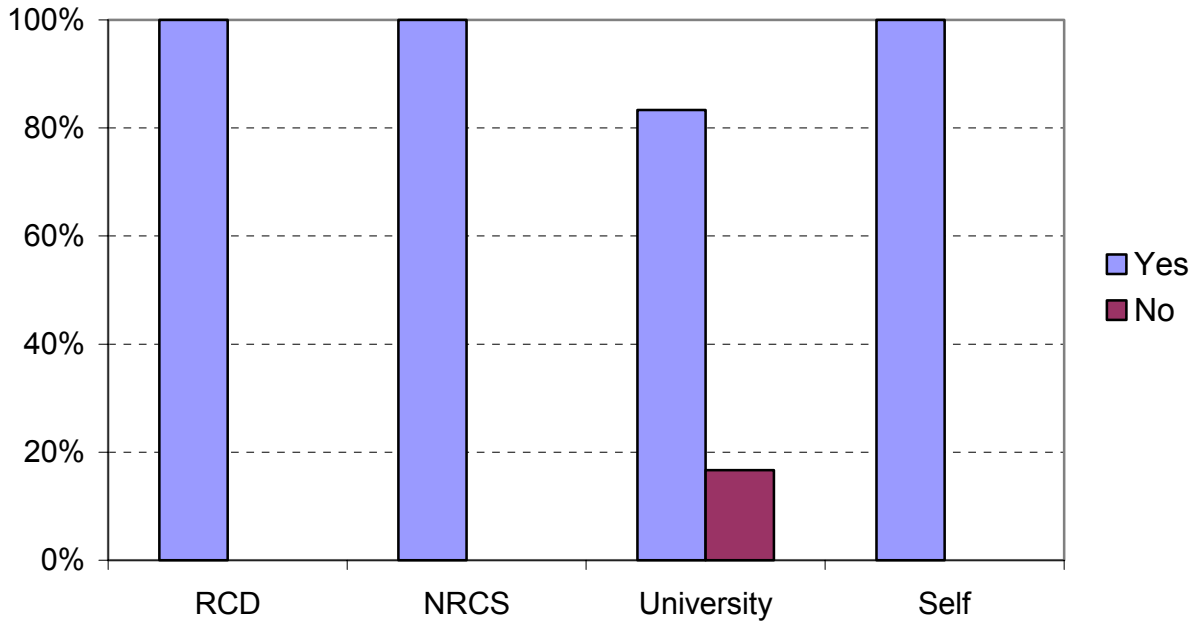


Figure 118. Can the management at this riparian grazing be corrected sufficiently to protect water resource and keep the grazing in place?



RIPARIAN GRAZING SITE EVALUATIONS BY PARTICIPANT EDUCATION.
Figures 119 - 124 represent the breakdown of site evaluations of the seasonal riparian grazing sites (Figure 29) based upon participant education. Table 5 defines acronyms utilized in the figures.

The only significant relationship found here was that while 100% of participants with natural resources and physical science degrees felt the impact could mitigated with improved grazing management, 15% of participants with natural resources protection degrees felt that the grazing needed to be removed completely.

Figure 119. Is this riparian grazing a threat to water resources?

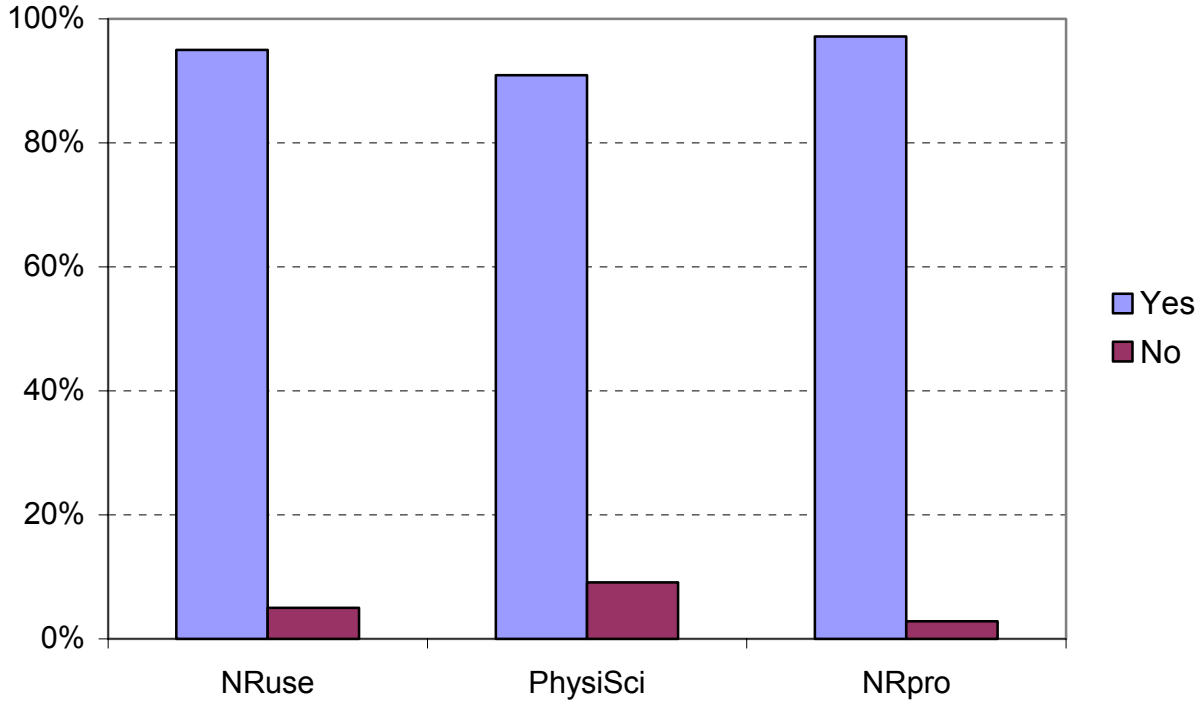


Figure 120. Mean threat rating (0=none, 5=extreme) of this riparian grazing to each water resource attribute.

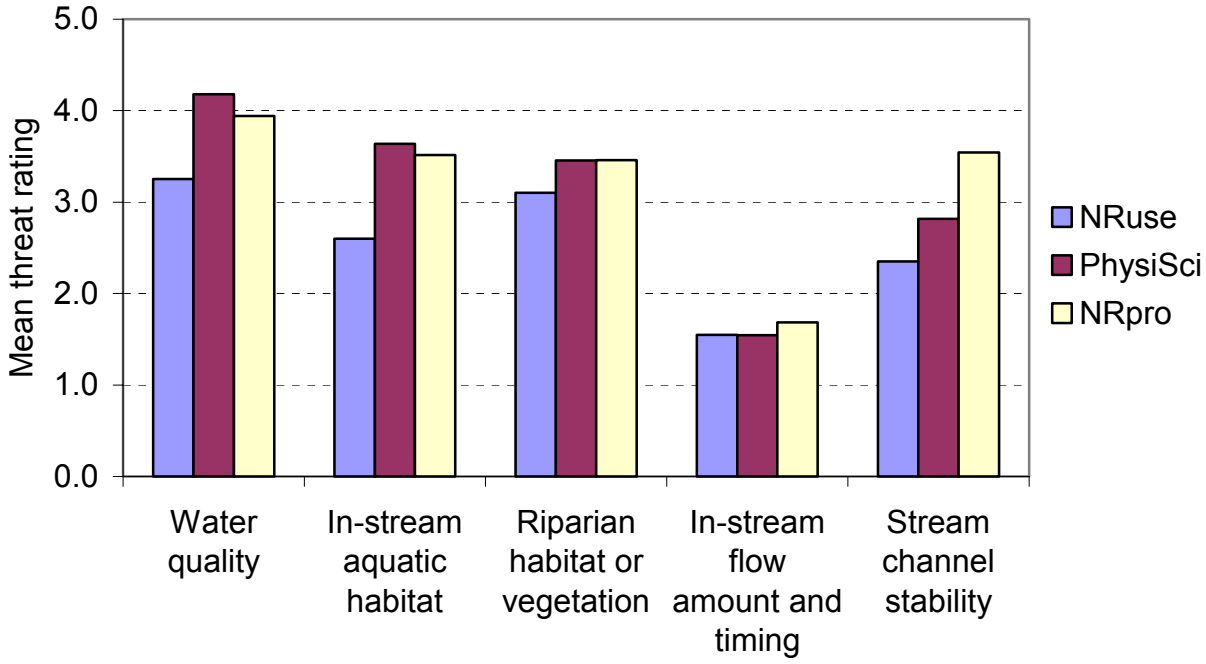


Figure 121. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRuse)**

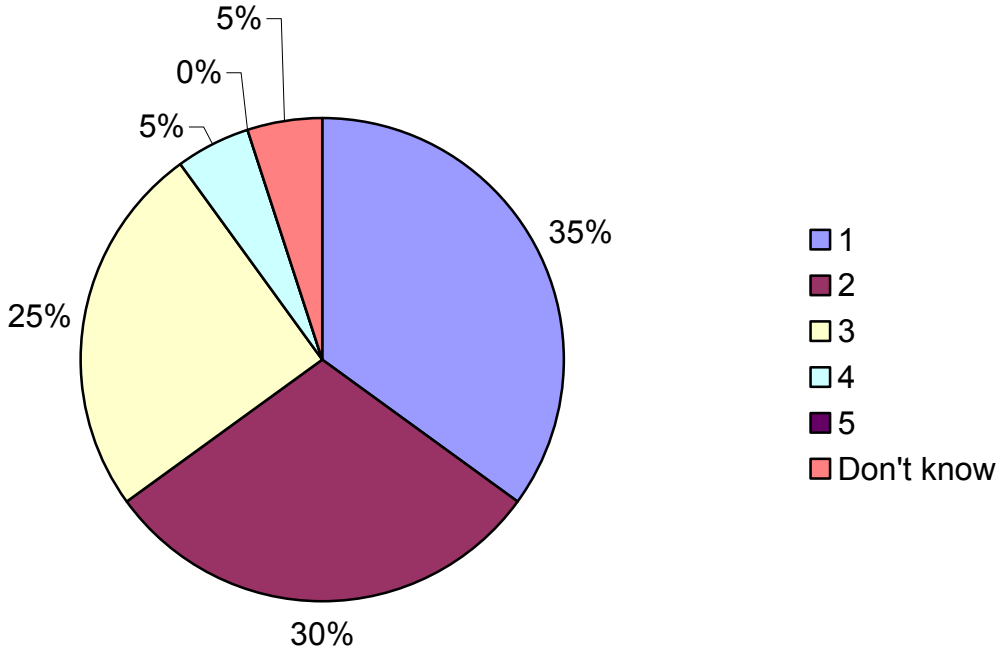


Figure 122. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(PhysiSci)**

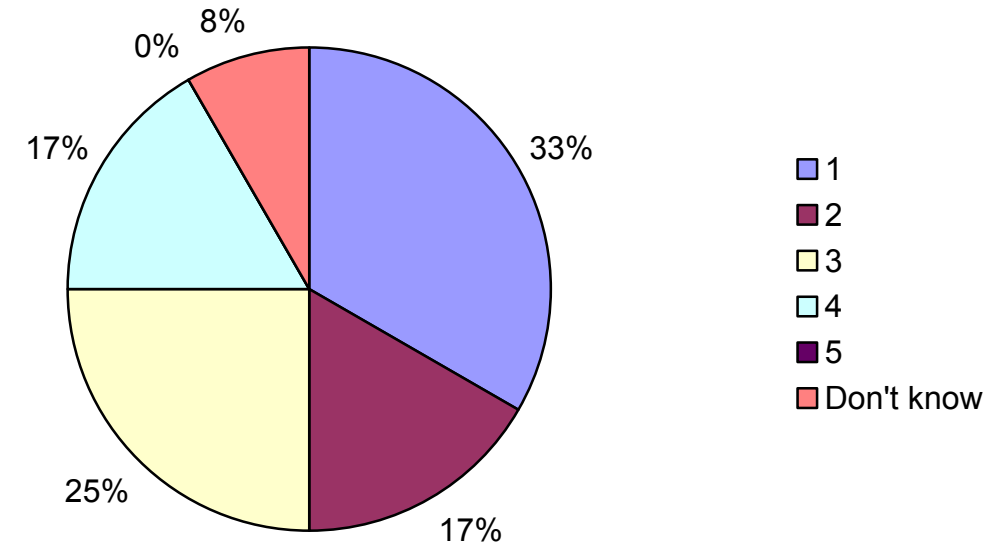


Figure 123. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(NRpro)**

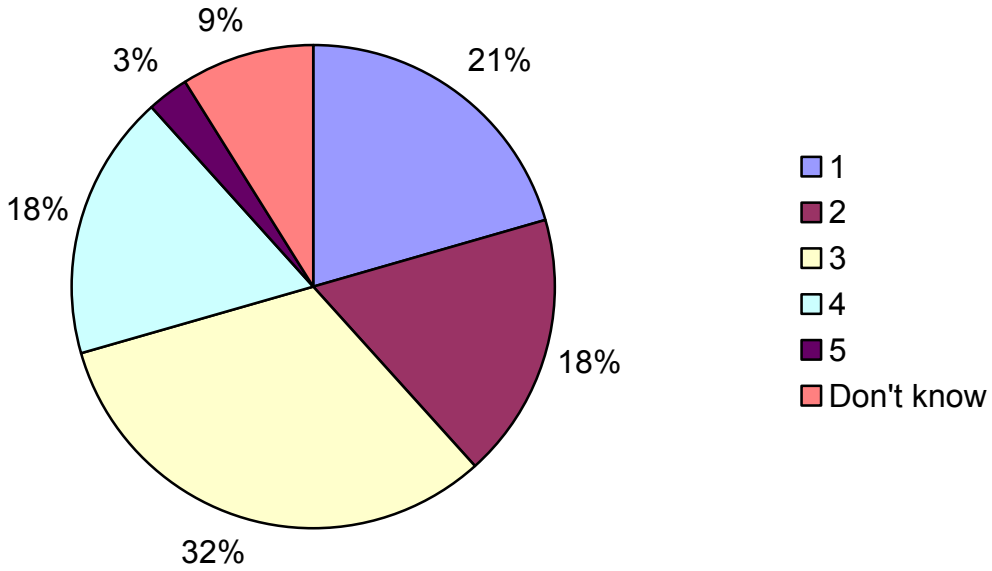
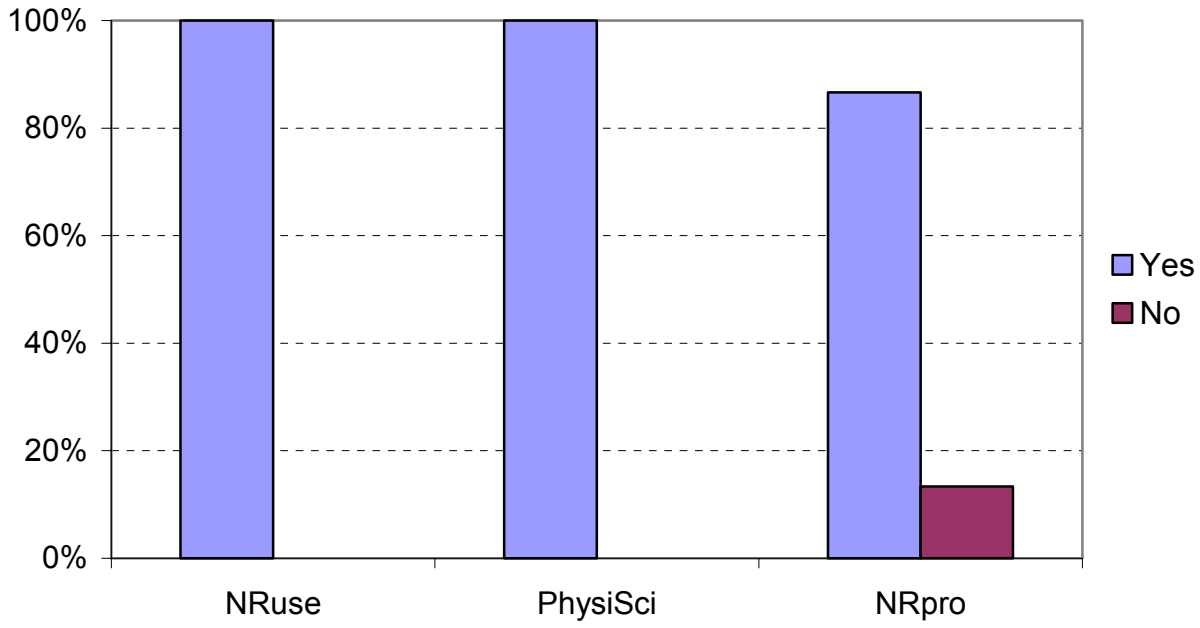


Figure 124. Can the management at this riparian grazing be corrected sufficiently to protect water resource and keep the grazing in place?



RIPARIAN GRAZING SITE EVALUATIONS BY PARTICIPANT EXPERIENCE.
Figures 125 - 131 represent the breakdown of site evaluations of the seasonal riparian grazing sites (Figure 29) based upon participant current education. Table 5 defines acronyms utilized in the figures.

As participant experience increased there was some who did not see this riparian grazing as a threat to water resources (~ 5% no with greater than 10 years experience), as did the belief that improved grazing management would mitigate the impact.

Figure 125. Is this riparian grazing a threat to water resources?

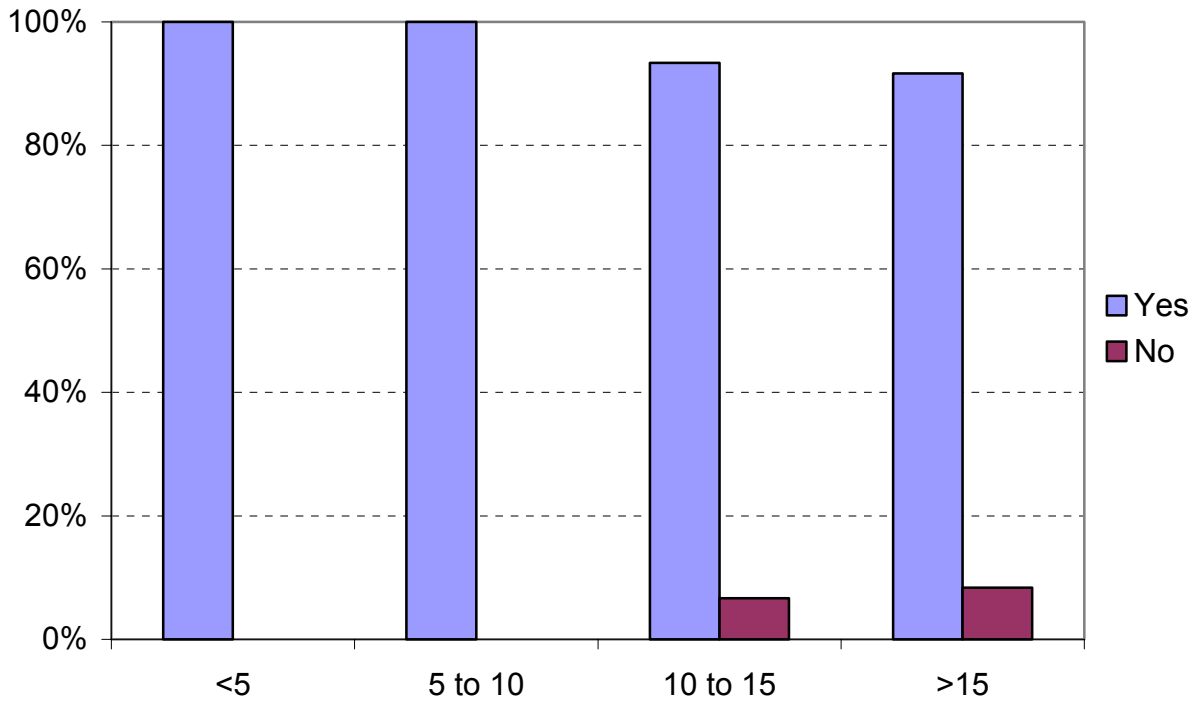


Figure 126. Mean threat rating (0=none, 5=extreme) of this riparian grazing each water resource attribute.

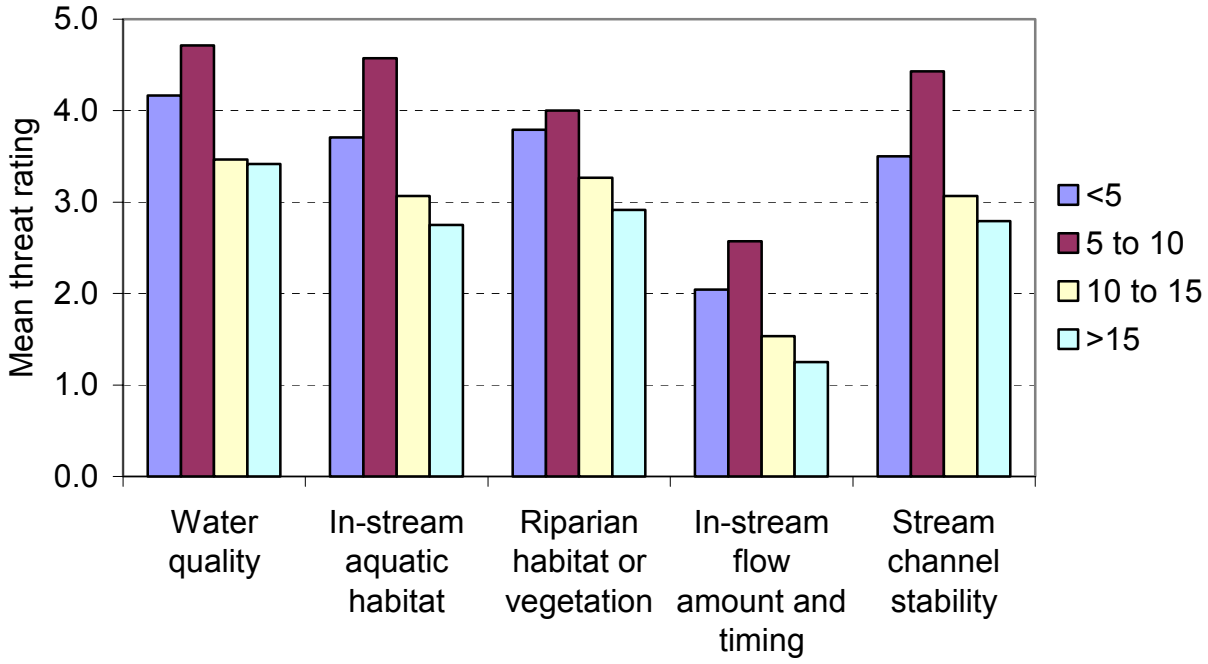


Figure 127. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(<5)**

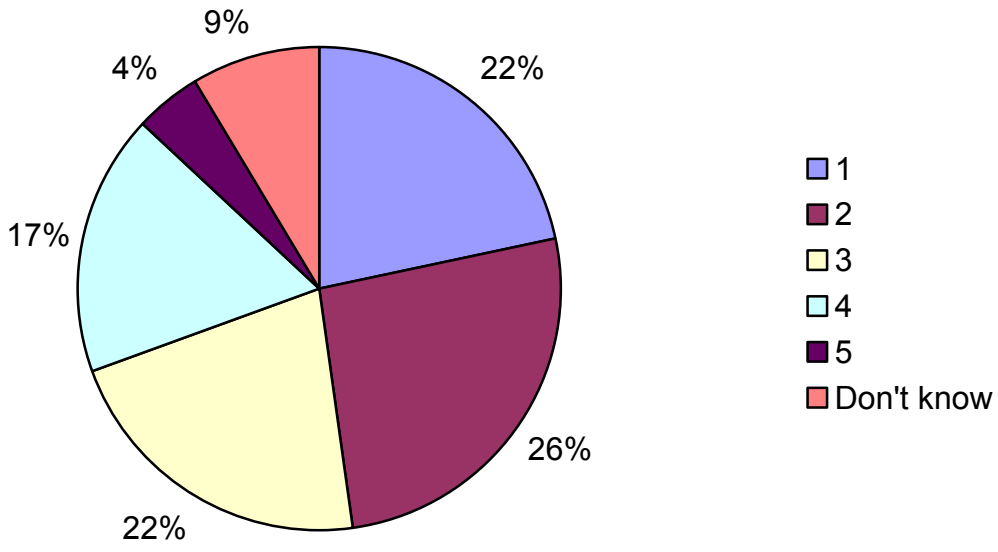


Figure 128. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(5 to 10)**

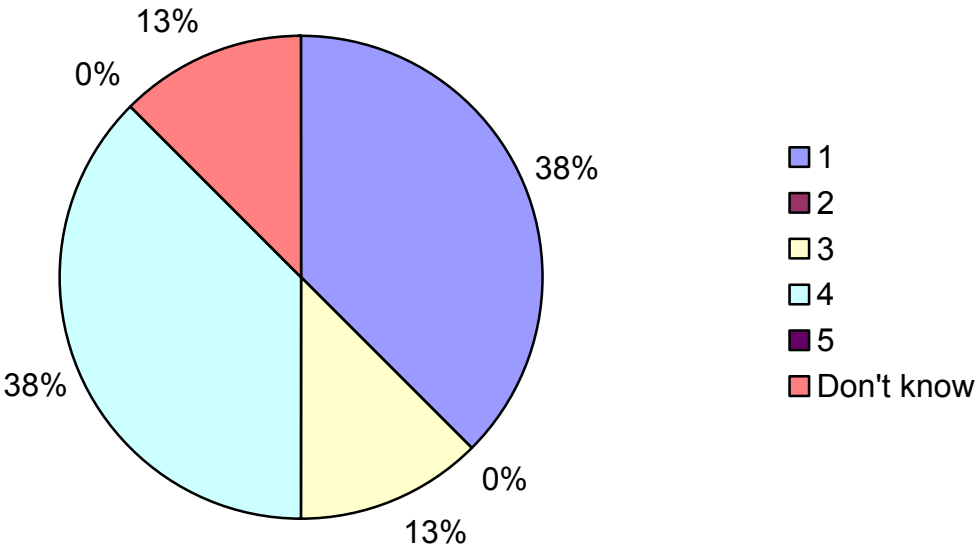


Figure 129. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(10 to 15)**

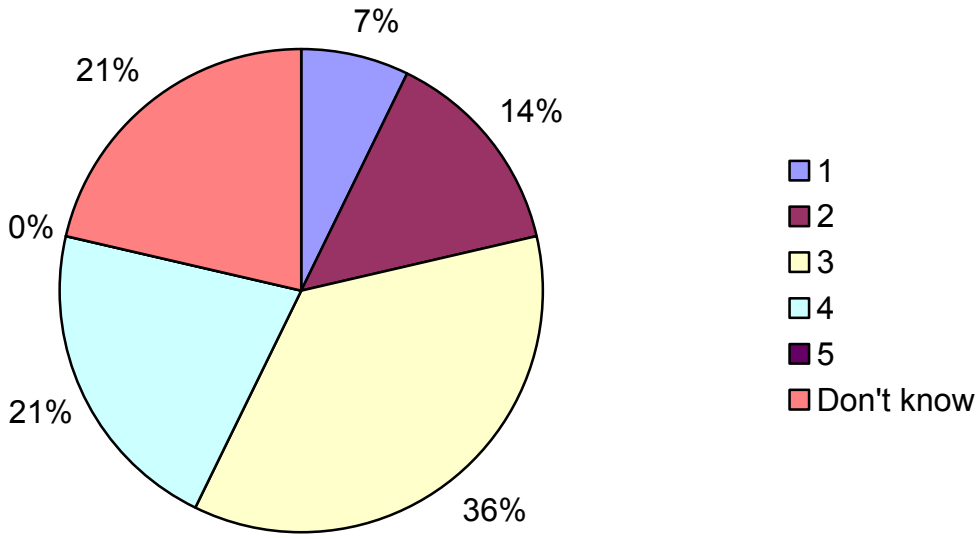


Figure 130. Rate this riparian grazing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(15<)**

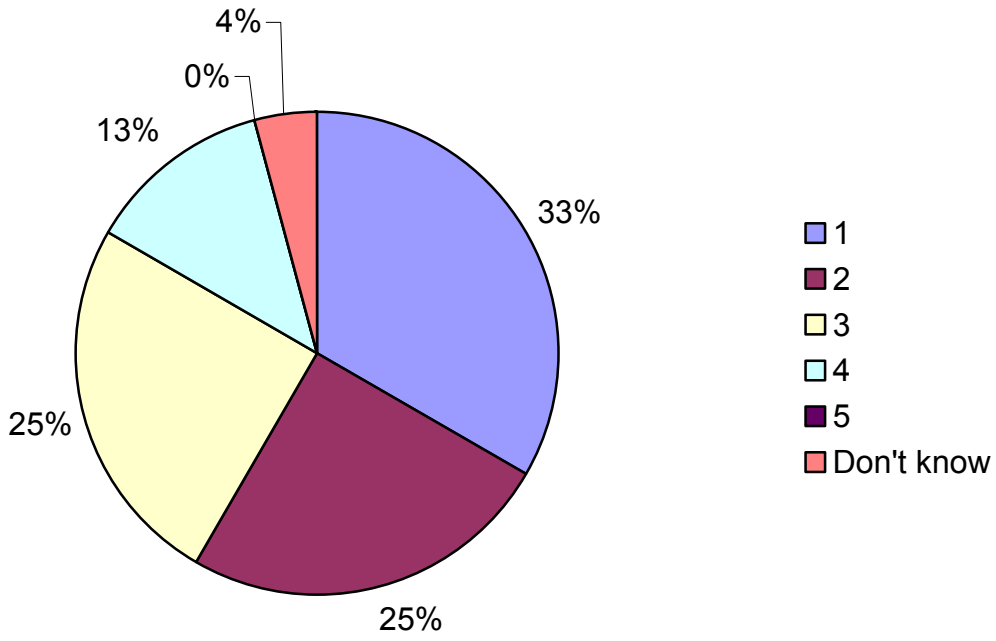
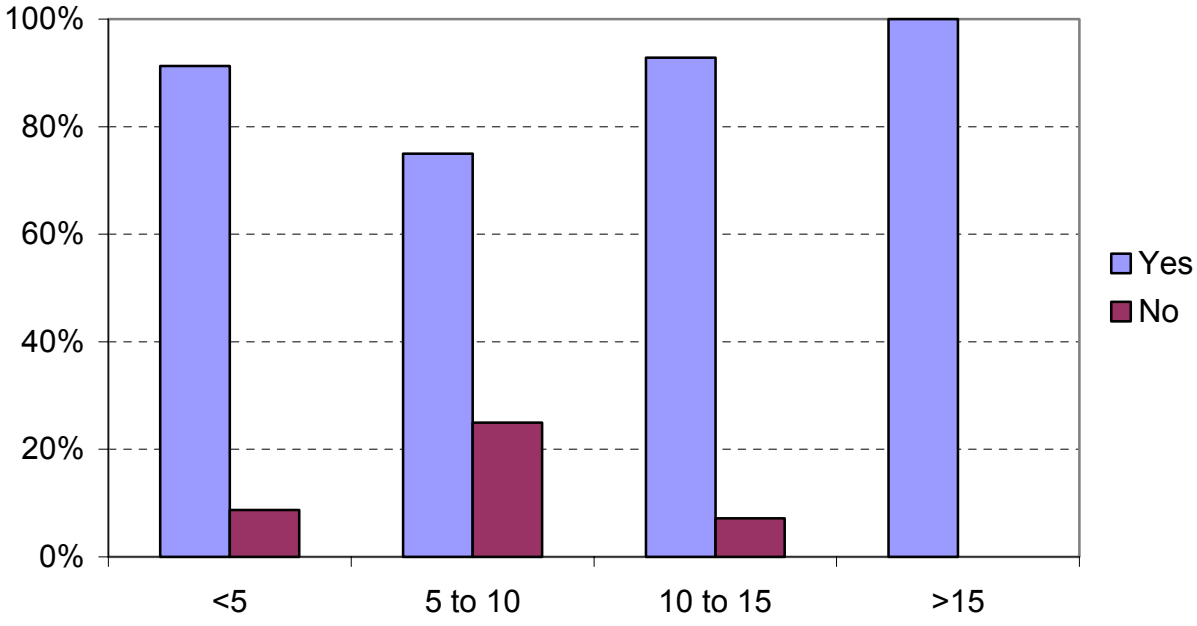


Figure 131. Can the management at this riparian grazing be corrected sufficiently to protect water resource and keep the grazing in place?



RIPARIAN GRAZING SITE EVALUATIONS BY PARTICIPANTS WHO DO AND DO NOT WORK DIRECTLY WITH LANDOWNERS.

Figures 132 - 136 represent the breakdown of site evaluations of the seasonal riparian grazing sites (Figure 29) based upon participant current education. Table 5 defines acronyms utilized in the figures.

This analysis indicates that 100% of participants who do not work directly with landowners saw these riparian grazing sites as a threat to water resources, while 95% of who do work directly with landowners saw the sites as a threat. There was close agreement about the potential for improved grazing management to mitigate these sites (~90% yes).

Figure 132. Is this riparian grazing a threat to water resources?

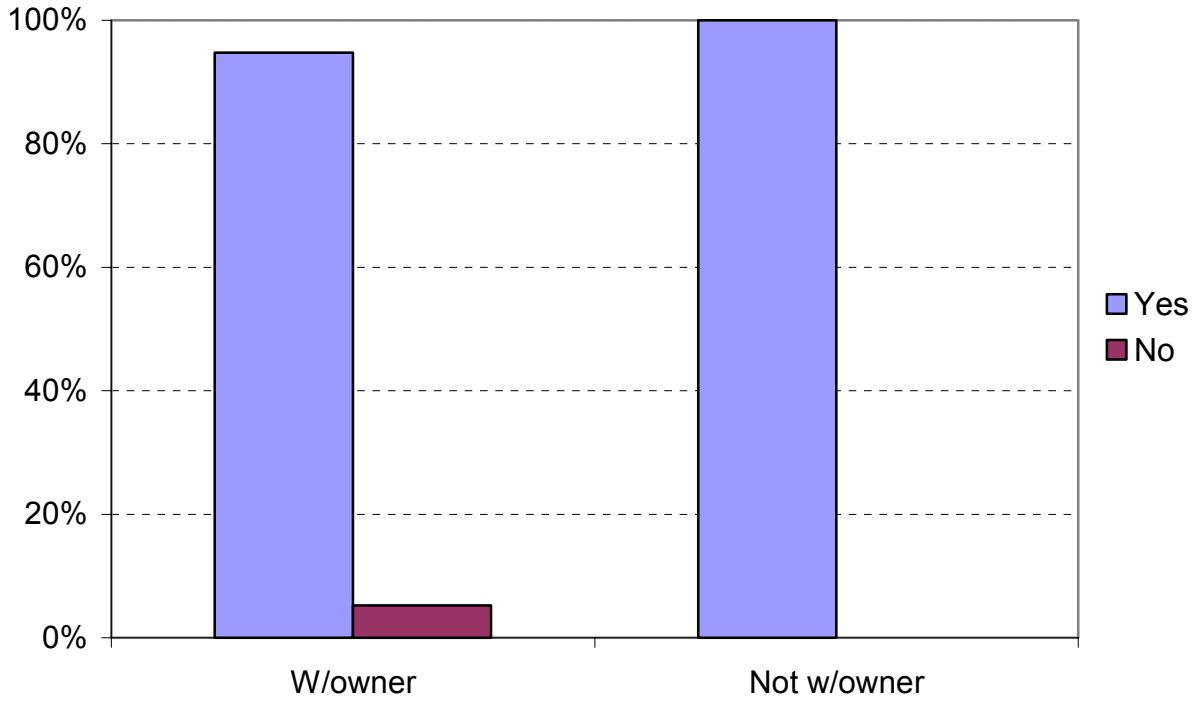


Figure 133. Mean threat rating (0=none, 5=extreme) of this riparian grazing to each water resource attribute.

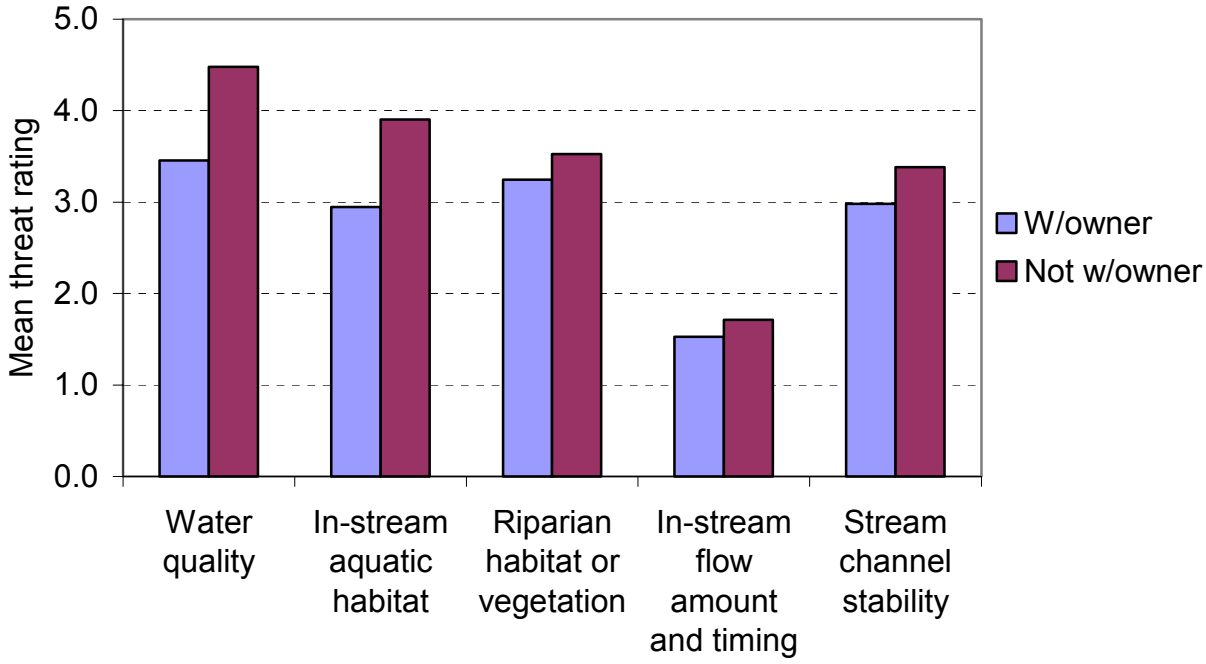


Figure 134. Rate this riparian grasing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(with owner)**

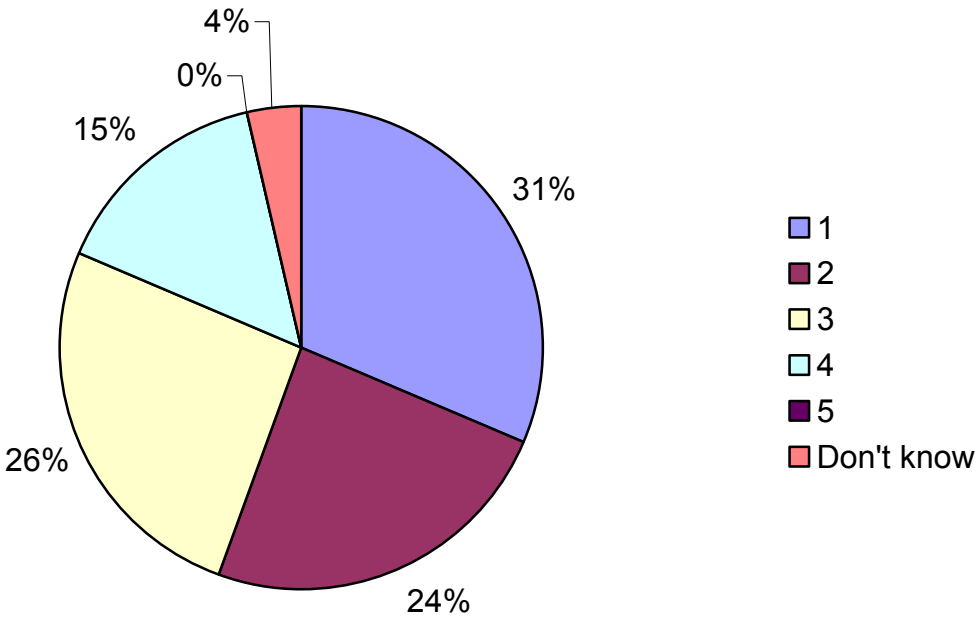


Figure 135. Rate this riparian grasing site's threat at sub-basin scale (10,000-20,000ac), 1=low, 5=extreme, **(not with owner)**

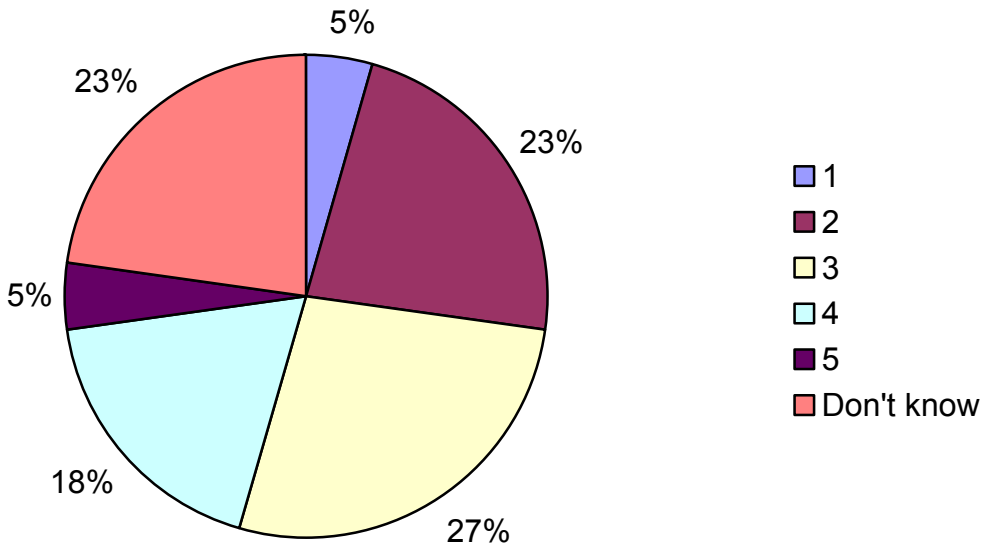
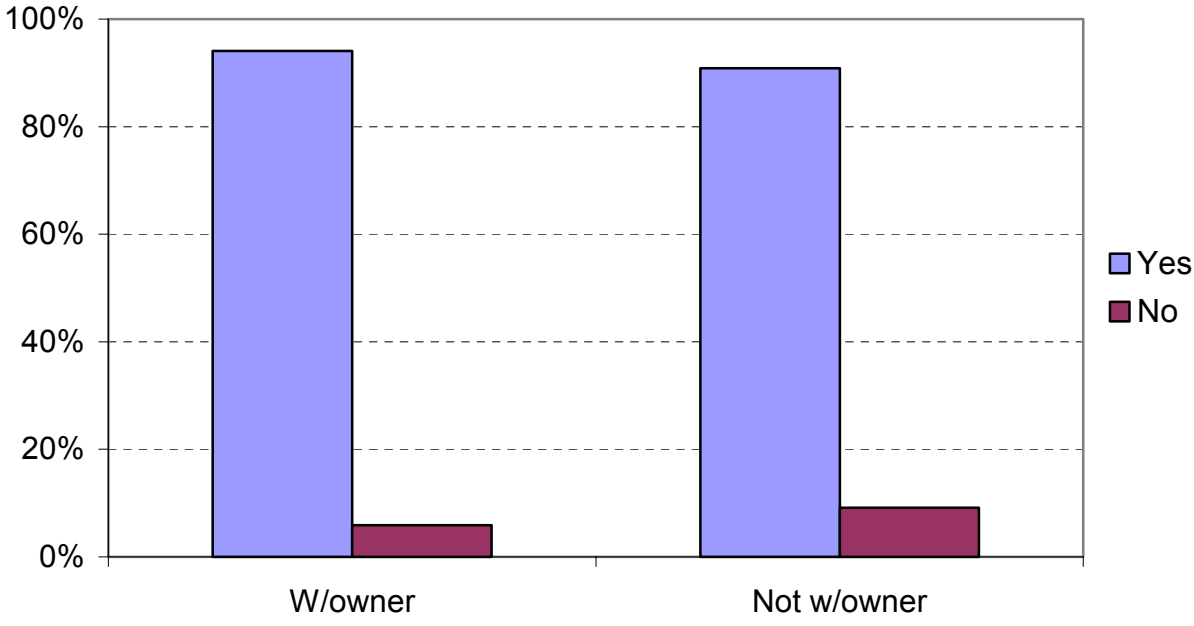


Figure 136. Can the management at this riparian grazing be corrected sufficiently to protect water resource and keep the grazing in place?



VII. SUMMARY

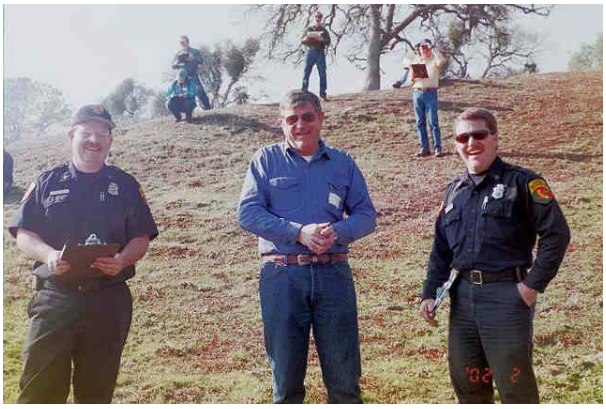
This project served as a forum for dozens of site specific discussions between natural resources professionals about specific range management and water resources interactions. A massive dataset was collected and analyzed, revealing professional opinions on the priority, cause, and remedy of common water resources impairments on California rangelands. The results of this project will be integrated into the UCCE-NRCS Ranch Water Quality Planning Short Course and other extension education venues for landowners and managers. These results will also be incorporated into continuing education venues conducted by UCCE, NRCS, and other agencies. Finally, these results will be published in appropriate natural resources journals.

In general we learned the following:

1. There is relatively strong agreement among natural resources professionals about what does and does not constitute a threat to water resources on rangelands. The strongest agreement is over sites such as culverts and corrals, and the weakest agreement is over sites such as seasonal stream crossings.
2. There is relatively strong agreement that the threat posed by these common range management practices is low to moderate at the sub-basin scale. There is a small component of the profession (<3%) who feel strongly that these practices constitute an extreme threat to water resources.
3. There is relatively strong agreement that management changes can be made to mitigate these threats, allowing the management activity to continue.
4. The variation in professional opinion can be in part attributed to professional demographics. However, these relationships can change from one site type to another. This was particularly true for the demographic of current employer.
5. Educational background was the strongest predictor of how a participant would evaluate a particular site's threat to water resources and the potential to mitigate that threat. Basically, participants with natural resources protection educational degrees were more likely to feel a practice was a threat, and less likely to feel that the threat could be mitigated with improved management.
6. Whether or not a participant works directly with landowners or not appears to have very little impact on his/her opinion about cause, priority, or remedy.
7. There is clearly a lot of potential to reduce the variability in professional opinion on these issues by continued efforts to facilitate cross discipline and cross agency training. The field is the best forum for this training and dialogue.
8. Reducing variability will not come from changing the opinion of one group to match that of another, rather from each group modifying the opinions of the other.
9. While the majority of the profession is in relatively close agreement, there exists within the profession a small percentage of people who have very different, and strongly held opinions form each other, and the norm.
10. In general, natural resources professionals need a better understanding of common ranch management practices and best management practices to mitigate water quality threats on rangelands. Particularly best management practices which are economically feasible for landowners.

VIII. ACKNOWLEDGEMENTS

The project team would like to express its appreciation to each of the workshop participants. The participants demonstrated a high level of professionalism and a genuine interest in the constructive resolution of water resources problems on California's rangelands. We'd also like to thank the superintendents and management staff at each of the workshop locations. Their willingness to host the workshops and participate in discussions about their own water resources problems clearly shows their dedication and leadership as land managers.



APPENDIX I: SFREC PARTICIPANT SURVEY
Sources of Rangeland Water Resources Impairment Workshop

---

1. Name: _____

2. Address: _____

_____

3. Phone: (_____)_____

4. FAX: (_____)_____

5. Email: _____

6. Education:

BS: Y N **Subject Area:**_____

MS: Y N **Subject Area:**_____

PhD: Y N **Subject Area:**_____

7. Professional Certifications (*check all that apply*):

□ **CA Registered Professional Forester**

□ **SRM Certified Rangeland Manager**

□ **Professional Engineer**

□ **Certified Geologist**

□ **SWCS Soil Erosion Control Specialist**

□ **Other:** _____

8. In your opinion, what are your areas of expertise? (*check all that apply*):

□ **Fisheries biology and management**

□ **Hydrology**

□ **Water Quality**

□ **Habitat restoration**

□ **Stream restoration**

□ **Nonpoint source pollution control / BMP Implementation**

□ **Range and livestock management**

□ **Vegetation ecology and management**

□ **Soil conservation**

□ **Forestry and Timber Management**

□ **Road Design and Construction**

□ **Other _____**

□ **Other _____**

9. <u>Total years</u> experience as a practicing <u>natural resources professional</u> (*not limited to water resources*): _____

10. Current title: _____

11. Current employer or agency:_____

_____

12. How would you categorize your agency or employer (*check all that apply*):

□ **Educational**

□ **Technical Assistance**

□ **Consulting**

□ **Regulatory**

□ **Federal**

□ **State**

□ **County**

□ **Private**

□ **Non-profit**

□ **Self employed**

□ **Other**_____

_____

13. Years with current agency or employer: _____

14. Years in your current position: _____

15. Current job responsibilities:

_____

_____

_____

_____

16. Do you work directly with rangeland managers:

Y N

17. If yes, how many years have you worked directly with rangeland managers:

_____

18. If yes, in what capacity do you work with rangeland owners / managers (*check all that apply*):

□ Provide education on water resources issues

□ Consult and make recommendations about on-ranch management

□ Assessment of on-ranch water resources problems

□ Regulatory, permitting, inspections

□ Participation in local RCD, watershed, CRM groups

□ Other_____

_____

_____

_____

_____

19. Previous natural resources positions and years spent at each (*list all that apply and years at each*):

1. _____Years:_____

2. _____Years:_____

3. _____Years:_____

4. _____Years:_____

20. Did you work directly with rangeland owners / managers <u>prior</u> to your current position: Y N

21. Have you heard of the CA Rangeland Water Quality Plan? Y N

22. Have you heard of the CA Ranch Water Quality Planning Short Course?

Y N

23. Have you participated in the CA Ranch Water Quality Planning Short Course? Y N

24. Have you planned / taught / participated in (*circle all the previous that apply*) educational programs on water resources issues for rangeland managers.

Y N

In what subjects_____

_____

25. In your opinion, what are effective approaches to achieve long-term Local, Regional and Statewide protection of water resources from ranch management practices (1 = not effective and 5 = highly effective). Repeat ratings can be given.

1 2 3 4 5 Development of new regulations

1 2 3 4 5 Stronger enforcement of current regulations

1 2 3 4 5 TMDLs (Total Maximum Daily Loads)

1 2 3 4 5 Permitting of ranch discharges

1 2 3 4 5 Landowner education and ranch water quality planning

1 2 3 4 5 Increased funding for on-ranch BMP implementation

1 2 3 4 5 Landowner driven watershed groups

1 2 3 4 5 Agency or 3rd party driven watershed groups

1 2 3 4 5 Other_____

APPENDIX II: SFREC SITE EVALUATION

Sources of Rangeland Water Resources Impairment Workshop

YOUR NAME: _____

SITE NUMBER: _____

---

1. Is this site a threat to water resources: Y N

2. If "yes" to question 1 then proceed to question 3, if "no" then explain why:

_____

_____

_____

_____

3. Which water resource attributes are threatened and to what extent (1 = barely threatened and 5 = extremely threatened). Circle a threat rating (1-5) only for those you think are threatened. Repeat ratings can be given.

1 2 3 4 5 Water quality (nutrients, temperature, sediment, etc.)

1 2 3 4 5 In-stream aquatic habitat

1 2 3 4 5 Riparian habitat or vegetation

1 2 3 4 5 In-stream flow amount and timing

1 2 3 4 5 Stream channel stability

1 2 3 4 5 Other _____

1 2 3 4 5 Other _____

4. Which processes appear to be occurring at this site and to what extent is each of them contributing to the overall water resources impairment (1 = least important and 5 = most important). Circle the importance rating (1 to 5) only for only those you think are occurring. Repeat ratings can be given.

1 2 3 4 5 Soil erosion & sedimentation

1 2 3 4 5 Nutrient loading and transport

1 2 3 4 5 Pathogen loading and transport

1 2 3 4 5 Soil compaction and increased surface runoff

1 2 3 4 5 Stream side vegetation damage

1 2 3 4 5 Stream channel damage

1 2 3 4 5 Increased stream temperature

1 2 3 4 5 Other _____

1 2 3 4 5 Other _____

5. What are the management activities that appear to be causing the water resources impairment at this site (*check all that apply*)

□ **Grazing of riparian and / or upland vegetation**

□ **Soil disturbance and trampling by livestock**

□ **Livestock trail location**

□ **Location of livestock nutritional supplement (salt, feed, etc.)**

□ **Location of livestock water source**

□ **Lack of an off-site livestock water source**

□ **Fence design and location**

□ **Confined animal facility (corral, holding pens, etc.)**

□ **Road Design / Location**

□ **Road Drainage**

□ **Other _____**

□ **Other _____**

6. On a scale of 1 (low threat) to 5 (high threat) how would you rate the threat this specific site poses to the nearest / adjacent water resource (stream, lake, etc).

1 2 3 4 5 Don't Know

7. On a scale of 1 (low threat) to 5 (high threat), would you rate this particular site a significant water resources threat at a sub-basin (10,000 to 20,000 acre watershed) scale.

1 2 3 4 5 Don't Know

8. On a scale of 1 (rare) to 5 (common), does this particular site represent a rare or common type of water resources threat found on ranches.

1 2 3 4 5 Don't Know

9. Do you see any evidence that the landowner is attempting to mitigate this problem. Y N

10. If "yes" to question 9, what mitigation activity do you see and how do you rate its probable effectiveness (1 = low effectiveness and 5 = high effectiveness).

1 2 3 4 5 _____

1 2 3 4 5 _____

1 2 3 4 5 _____

11. In your opinion, can the ranch management practice at this site be modified or corrected sufficiently to protect water resources and still keep the practice in place on this site. Y N

12. If "yes" to question 11 proceed to question 13, if "no" then what action do you would recommend.

_____

_____

_____

_____

13. What best management practices (BMPs) or changes in the ranch management practice do you recommend as being practical, feasible and sufficient to mitigate this site. List each BMP and rate your opinion of each BMP's expected effectiveness (1 = low effectiveness and 5 = high effectiveness). Repeat ratings can be assigned.

1 2 3 4 5 _____

1 2 3 4 5 _____

1 2 3 4 5 _____

1 2 3 4 5 _____

1 2 3 4 5 _____

1 2 3 4 5 _____

14. What do you think would be the total cost of the suite of BMP's you just recommended to mitigate this site (*check only one*).

□ **$0 to 100**

□ **$100 to 1,000**

□ **$1,000 to 5,000**

□ **$5,000 to 10,000**

□ **>$10,000**

□ **Do not know**

□ **Do not think cost is relevant when making water resources protection recommendations.**

15. Would the BMP(s) you suggest for this site require a permit(s) (*circle one*).

Y N Do not know

16. If "yes" to question 15, what type of permit(s) and from which agency.

_____

_____

17. What do you think is the most effective way to first approach to the landowner to start the process of mitigating this site.

□ **Write a letter to the landowner**

□ **Call the landowner**

□ **Meet with the landowner**

□ **File a complaint with a water resources regulatory agency**

□ **Other**_____

_____

18. What could you and your agency do to help the landowner mitigate this site.

_____

_____

_____

_____